THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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CLEVELAND, O., SEPTEMBER 18, 1890.

THE WEEK IN IRON CIRCLES.

General Features. The conspicuous fact in connection with the business of the country, announced during the past week, is the enormous cotton yield for 1890. The official report of the New Orleans Cotton Exchange states that the total crop amounts to 7,311,322 bales, exceeding the largest crop ever grown by 265,489 bales, and the crop of last year by 373,032 bales. Not only is the crop of 1889-90 the largest ever produced, but it has moved off with unexampled rapidity and brought full prices throughout the year, netting to the farming interests a handsome surplus. In iron, active buying all along the line seems to be the rule at present. At Cincinnati, for example, an active demand has been experienced for mill iron at prices current a week ago, and some liberal sales have been made; but the supply of these grades is scarcely equal to the wants of the buyers, and a firm feeling has resulted. There has been a steady consumptive demand for the lower grades of foundry irons for delivery during the remainder of the present year, and in not a few instances orders have been entered into for the first two months of next year, but the furnaces strive to secure, and in some instances obtain, an advance for such deliveries. The movement of iron from furnace yards and other places of storage, on back orders, is heavy, but still there is much complaint of lack of cars or other facilities in the South, to make the shipments required by consumers. There have been moderate sales of Southern charcoal brands, but less inquiry for Lake Superior irons. The furnaces in the lake regions, however, have little iron to dispose of, the full capacity of such stacks, on ordinary grades having been previously sold. The demand for muck bar has continued extremely active, and for orders already placed, the mills crowded with orders are urging deliveries anticipated, but with little success, because of the over-burdended capacity of the puddling furnaces. At Louisville, too, there has been a steady buying during the week with sales of some moment, several transactions of a thousand tons each having been made. The demand for prompt shipment is heavy, and a few buyers are in the market for deliveries running through the first six or eight months of next year. It is a peculiar as well as very unusual spectacle that presents itself, finished iron selling higher than it did last Fall, when iron was over $3 a ton higher than now, and pig metal continuing low. The situation among Southern furnaces is such that as soon as money is easier it will be almost impossible to keep the price of iron at the present basis, as furnaces have small stocks, are being rapidly sold up, and before long it will be a question of obtaining the iron, provided the present demand continues, which is bound to increase prices. A very moderate amount of business in small lots, car loads and fifty tons, and no large transactions whatever, have taken place during the past week at Detroit. To offset this to a certain extent, however, a number of good sized inquiries are in hand, chiefly confined to Lake Superior charcoal pig iron. These inquiries are from manufacturers who depend upon lake navigation for cheap freights, so that should they result in actual transactions the material would be sold only for prompt delivery. In view of the fact that every charcoal furnace is closely sold up, it is fair to suppose that these transactions will be at full market rates, and possibly at some advance. A good many inquiries keep floating around, but they mostly fail to materialize. Southern furnaces claim that their position continues to be strong, both with regard to stocks, and to the run of orders they are receiving. In contrast with general reports, the Chicago market continues inactive, and the past week has shown but small amount of buying. On the other hand heavy consumption goes steadily on and the foundries and machine shops are well stocked with orders. All indications now point to a healthy market during the remainder of the year. The situation this week at Pittsburgh is not quotably different from what it was at the date of last report. Business is rather languid and prices are unchanged, but there is one encouraging feature in the fact that during August the consumption of pig iron was greater than the output, and if this condition of things will continue awhile, it will almost certainly bring about the long-expected improvement in prices.

Iron Ore. The local market is very quiet, for the presumable reason that there is nothing to sell. Barring, say, two per cent. of the estimated season's output, the visible supply of ore has found a market, and the insignificant quantity not as yet disposed of is either held above the market price, or else for one reason or another is unsalable. The demand from consumers who usually depend upon Lake Superior ore for their stocks has been fairly well supplied, but the furnacemen east of the Alleghenies are in want of considerable quantities of non-Bessemer ore, for which they are making active inquiry in this market. No less than 110,000 tons of that material could have been disposed of during the week at good prices, but not a single producer of ore dared to sell another pound, pending the filling of orders and contracts several months old, and to carry out which several of the ore men will have a very hard time. While the lake shipments are about 850,000 tons ahead of the corresponding season last year, the gain has not been maintained of late, and in view of the present delay on the part of vessels in getting loads, there is every prospect for a falling off henceforth. It must be remembered, too, that last year the rush of navigation was continued until the very day of expiration of lake insurance, so that the calculations of those who expect a repetition of those conditions are resting upon a very slim foundation. Charters are inactive and the going rate is $1 from Ashland and Marquette, and 85 cents from Escanaba.

Pig Iron. Although considerable sales are reported for the week, the market is dull and weak in almost all its lines. Pig iron in general seems to be pounded very hard, but Bessemer is getting the worst all around, selling as low as $17.35, cash, at Valley furnaces. All the other grades are suffering in proportion, and, figuring up the high prices of ore and coke, one is almost tempted to believe that the furnacemen are in the business for the pleasure it affords them, and without the hope of earthly reward. A very large lot of mill iron has gone at a trifle below $16, four months. While everybody predicts better times thirty or sixty days hence, the present is very cheerless indeed for the average furnaceman. There is much complaint on the part of makers of pig iron of their inability to secure a sufficient quantity of coke. The railway companies are short of cars, and one local concern that consumes fifty car loads of coke a day, is in receipt of less than twenty cars daily.

Merchant Iron. Every manufacturer of finished iron, no matter what the name or product, is reaping a harvest. All the mills are booming, some of them refusing to quote prices for 1890 delivery. Steel stock of all kinds is high, and is scarce as well. Muck bar cannot be had at any price, but the last sales were made at $30.50. Bar iron easily brings $1.80 here, and the stock is almost exhausted. Sheets are no less scarce, and sell at all manner of prices, since the makers give very little satisfaction to consumers, either in quotations or in the filling of orders. Old rails are so high that those who have muck bar on hand prefer to use them in the manufacture of bar iron, and the price of rails is still on the advance, so that they are practlcally out of reach.

OUR ORE AND COAL HANDLING FACILITIES.

To those readers who have carefully followed the series of articles on the ore and coal handling facilities of the lower lake ports, in preceding issues of *The Iron Trade Review*, the facts set forth were quite a revelation. The growth and expansion of the iron trade and its allied branches have significantly affected the commerce of the Great Lakes, but the extent to which the new order of things has gone could only be appreciated by means of the data so graphically set forth by the special representative of this journal, detailed to visit the various ports. The publication of these facts has called forth much favorable comment and very little correction. With a few corrected figures that have since been furnished us, we compile the following series of tables. Taking up, first, the iron ore handling facilities of the different docks, we find that the length, width and daily capacity of the respective ports are as follows:

Port.	Length.	Average Width.	Total Square Feet.	Daily Handling Capacity. (Tons)
Buffalo	4,000	275	1,100,000	5,000
Erie	6,400	150	960,000	10,000
Ashtabula	10,460	275	2,876,500	26,070
Fairport	6,550	250	1,637,500	12,000
Cleveland	9,200	295	2,714,000	25,400
Lorain	6,000	100	600,000	3,000
Huron	275	100	27,500	1,000
Sandusky	1,314	100	131,400	4,000
Toledo	1,350	75	101,250	4,500
Total	45,549	180 (av.)	10,148,150	90,970

From the above it will appear that Ashtabula leads in dock space and daily handling capacity, though Cleveland is so closely behind that the race is very even. The total dock space for handling iron on lower lakes is over ten million square feet, and the ore docks, if strung along in one line, would show a total frontage of eight and six-tenths miles, with an average width of 180 feet.

When we come to consider the ore storage capacity of the various docks, we find that they show up as follows:

Port	Length	Average Width	Capacity. Tons.
Buffalo	4,000	275	150,000
Erie	7,200	150	300,000
Ashtabula	18,460	275	2,000,000
Fairport	6,550	250	1,000,000
Cleveland	12,000	295	1,875,000
Lorain	9,000	150	350,000
Huron	275	100	30,000
Sandusky	3,000	100	215,000
Toledo	4,350	75	565,000
Total	64,835	185 (av.)	6,485,000

With regard to the foregoing table it should be explained that the length of storage includes, of course, the frontage of docks where they are used for this purpose. It should also be understood that Buffalo has no storage outside of the docks; Erie, Ashtabula, Cleveland, Lorain and Toledo, store on docks and trestles; Fairport and Huron on docks alone, and Sandusky on trestles alone. As will be noticed, the total storage capacity of Lake Erie ports is 6,485,000 tons.

The coal-handling facilities of the nine Lake Erie ports are as follows:

Port.	Length.	Average Width.	Daily Capacity. (Tons)
Buffalo	8,000	150	28,000
Erie	3,600	150	5,800
Ashtabula	3,205	250	8,400
Fairport	1,050	250	2,500
Cleveland	11,300	175	12,200
Lorain	6,000	150	4,500
Huron	1,000	100	1,000
Sandusky	1,117	100	3,800
Toledo	3,000	100	8,950
Total	38,272	158 (av.)	75,150

With the improvements to be commenced the ensuing Fall, and with the rapid advance in the character and capacity of handling machinery, the Lake Erie ports will show a decided gain next year, even upon the magnificent exhibit above set forth.

MANUFACTURED GAS IN IRON WORKS.

At the time of its completion, *The Iron Trade Review* gave a pretty full description of the fuel gas plant at Akron. Very expensive works were put up and liberal franchises were granted by the city, in the matter of right of way through the streets, etc. From a prominent manufacturer we learn, however, that the results have not been fully up to expectations. Few residences have been supplied, and, in the case of one large manufactory at least, the introduction of the new fuel was quickly followed by its rejection, on account of insufficient supply, etc. We do not state these facts to discredit the system used in Akron, but to show that important improvements are still needed before the much desired end is reached.

In the meantime, it may be interesting to learn what is being done elsewhere to hasten the era of manufactured fuel gas. From the Pittsburgh *Dispatch* we learn that the Pennsylvania Tube Works Company is constructing producers at its works, and will be ready to operate with coal gas by the first of January. These works were troubled last Winter by shortages in the natural gas supply, and the trouble has continued since. Meantime, the pay of the men goes right on, adding materially to the cost of the total product. Manufactured gas is used with satisfactory results at the Riverside Iron Works, at Wheeling, W. Va.; by the Warren Tube Co., of Warren, O., and by the Syracuse Tube Works, Syracuse, N. Y. These all use the system which is being adopted by the Pennsylvania Tube Works. At none of these places is coal any cheaper than in Pittsburgh.

Some recent cost figures from the Beaver Falls plant of Carnegie, Phipps & Co. show that, on a basis of coal at $1 per ton delivered at the mill, the cost of manufactured gas runs from 1 cent per 1,000 feet for the cheapest grade to 5 cents for first-class fuel. The gas used in ordinary iron and steel metallurgical work costs about 1½ or 2 cents per thousand feet. It is claimed that the repairs on this description of plant will not exceed 5 cents per ton of iron heat, and it is generally held to be both economical and convenient.

BOILER EXPLOSIONS IN GREAT BRITAIN.

Interesting figures are given by the Chief Engineer of the Engine, Boiler and Employers' Liability Insurance Company (Limited), of Manchester, England, in his report for 1889: The number of break-downs in engines recorded is 136, which are classified as follows: 37 per cent. due to causes purely accidental or unascertained; 18 per cent. to negligence of owners or attendants; 14 per cent. to old defects and wear and tear, and 31 per cent. to weakness from faulty design or bad workmanship. The following table shows the particular part of the engine to which the damage in each case appeared to be due:

	During 1889	Numbers during previous 9 years.	Totals.
Spur gearing	20	214	234
Valves and valve gear	25	211	236
Air-pump motions	13	140	153
Air pump buckets and valves	8	92	100
Columns, entablatures, bed-plates and pedestals	11	67	78
Bolts, screws, gibs, cotters and straps	51	67	82
Main shafts	7	58	65
Parallel motions, links and guides	8	57	65
Pistons	3	35	38
Cylinders, valve chests and covers	3	29	32
Fly-wheels	2	26	28
Piston rod crossheads	6	25	31
Piston rods	4	23	27
Cranks	1	21	22
Governor gear	1	20	21
Air pumps and condensers	4	18	22
Crank pins	1	12	13
Gudgeons in beams	2	11	13
Beams and side levers	0	9	9
Connecting rods	1	8	9
Total wrecks, cause unknown	0	5	5
Second motion shafts	0	1	1
Main driving ropes	1	0	1
	136	1,149	1,285

With regard to the inspection of boilers, the number of thorough examinations made was 90, as against 96 in 1888, but, in addition to these, there were 389 internal examinations, 216 hydraulic tests and 31,440 ordinary inspections. The result of this work has been the discovery of 925 defects of various kinds, of which no less than 284 were of such a nature as, if not detected, must have led to explosions within a comparatively short time, since they either necessitated immediate repair or considerable reduction of pressure. Of these defects, 175 were cases of corrosion and grooving, 61 fractures, 48 safety valves excessively overloaded or totally inoperative.

In England there is a growing disposition to hold the owner of the boiler as primarily responsible for its condition. All of the reports of the Board of Trade Commissioners the past year have held to this policy. The result will doubtless be an increasing care in requiring tests of new boilers and in seeing that they are kept in proper order and in experienced hands. American steam-users will doubtless read these facts with interest.

THE *Canadian Manufacturer* reiterates the assertion to which attention has heretofore been called in the *Record* that Canadian Bessemer ore can be laid down in Cleveland, duty paid, for $3.90 per ton. If this be true, it is hard to understand why this ore is not carried to Cleveland and other lake ports and sold. Good Bessemer ores bring $5 to $7 per ton on the Cleveland docks. —[Philadelphia Record, Free Trade.

Canadian Bessemer ore was laid down at Cleveland in comparatively small quantities for two or three years, but it was found to contain so much sulphur as to make its use in the furnace impracticable.

THE Exposition season is over, and the success of these great

gatherings of the people is already assured. Pittsburgh, Detroit, Milwaukee and other cities have had very creditable shows. Cleveland hasn't yet gotten around to one, but will in due time.

WHAT appears to be a mythical report is the announcement that English capitalists will construct a ship canal through New Jersey from the Delaware river to the Atlantic, a distance of fifty miles. This would be a stimulus to the canal craze, indeed.

OUR Pittsburgh friends insist in one breath that there is a plentiful supply of natural gas, and in the next issue orders for the erection of manufactured gas plants. There is no doubt that they are correct.

WHO has heard of a Scotch pig iron "corner" on this side of the Atlantic? The London papers insist that it has its habitat in Wall street. Have our manufacturers any knowledge of its existence?

THE Senate has passed the Tariff bill, with about 400 amendments. The House has promptly rejected them and then conference committees will fight it out.

CLEVELAND stands eighth among twenty-seven leading cities, in the number of buildings erected in 1889.

THE EARTH A GREAT DYNAMO.

BY JACOB REESE.
(Inventor of the Basic Steel Process.)

The earth is a great dynamo, having a higher peripherical velocity than any dynamo ever constructed by man. The greatest peripherical velocity being at the equator, the greatest dynamic action will be exerted at that point. The phenomena of sun rays are not forced to the earth by the action of the sun, but are produced by the dynamic action of the earth drawing the energy from the sun to the earth; and as the greatest dynamic action is at the equator, so the phenomena of sun rays will be generated at that point, and least at the poles. The phenomena of sun, moon and stars, as seen by us are not real, but rather images of them formed in our atmosphere by the dynamic action of the earth. The energy drawn to the earth by its dynamic action passes from its periphery towards its center, and from there to and out of the North Pole, and from there to the North Star. The greatest energy being drawn to the earth at the equator, and the greatest peripherical velocity being at that point, the temperature will be highest there, for temperature is the measure of molecular velocity, as weight is the measure of matter; and the temperature of all points on the earth (except as changed by wind and water) will be relative to the peripherical velocity and its corresponding dynamic action. Thus it is coldest at the poles because the peripherical velocity is lowest, and the dynamic action least. It is colder at the South Pole than at the North Pole, because the energy drawn to the earth passes out at the North Pole and puts the water at that point into such a high state of activity as possibly to produce an open polar sea.

As before stated, the greatest energy will be drawn to the earth at the equator, because the peripherical velocity and corresponding dynamic action is greatest at that point. This energy passes inward and is focused at or near the earth's center, and produces incandescence, so we see that the internal heat of the earth is not produced nor sustained by the combination of fuel such as coal, oil or natural gas, but by the incandescent dynamic action of the earth; and as this dynamic incandescence is greatest at the equator, the volcanic eruption will be greatest in the torrid zone. The phenomenon of aurora in the Northern skies is greatest the farthest north, and is caused by the electric current passing from the North Pole to the North Star. The peripherical velocity being at zero at the pole, and but low near to the pole, the electric energy passing out of the earth, deflects the electric currents from entering the earth at that point, and draws them through the atmosphere towards it, and thus produces a velocity of the atmosphere that exhibits luminosity.

What are known as sun spots are probably great cavities in the sun, and the electric energy drawn from the sun would be less from cavities than from the solid, so that the rays would be weaker and more easily deflected during the period when sun spots were present than when they were not present, and so I account for the fact that the aurora is much greater during sun spot periods than otherwise. The phenomenon of gravity is produced by the dynamic action of the earth drawing all electric matter to it. The differential conductivity of water causes its differential gravity. The weight of the atmosphere is merely the measure of its conductivity. The phenomenon of the magnetic needle is caused by the electric current passing towards and out of the North Pole. In the term "north pole" I mean the point where the energy current leaves the earth for the North Star. There are many other phenomena that may be cited to favor this theory, but this will be sufficient for the present.

400 CHESTNUT STREET, PHILADELPHIA.

CORPORATIONS can only be organized under the laws of Nebraska for a lawful purpose, and any acts done by such corporation for the accomplishment of a purpose not lawful is unauthorized, in excess of its powers, and therefore illegal and void. The acts of a corporation to be unlawful need not necessarily be wrong by prohibition or wrong of themselves, although such acts are always illegal; but any act which by the terms of a charter it is not authorized to do is in excess of its powers, and therefore unlawful.

CONDITION OF THE BLAST FURNACES OF THE UNITED STATES.

September 1, 1890.

[CONDENSED FROM THE AMERICAN MANUFACTURER.]

LOCATION OF FURNACES.	CHARCOAL. Total No. of Stacks.	CHARCOAL. In Blast. No.	CHARCOAL. In Blast. Week'y capacity.	CHARCOAL. Out of Bl'st. No.	CHARCOAL. Out of Bl'st. Week'y capacity.	BITUMINOUS OR COKE. Total No. of Stacks.	BITUMINOUS OR COKE. In Blast. No.	BITUMINOUS OR COKE. In Blast. Week'y capacity.	BITUMINOUS OR COKE. Out of Bl'st. No.	BITUMINOUS OR COKE. Out of Bl'st. Week'y capacity.
New England	13	7	606	6	502					
New York	9	3	368	6	747	6	4	3,543	2	733
Pennsylvania	17	5	397	12	651	1	0	0	1	600
Upper Susquehanna Valley						1	0	0	1	200
Pittsburgh						21	18	24,611	3	3,366
Spiegel						1	0	0	1	833
Allegheny Valley						1	0	0	1	531
Shenango Valley						19	16	11,665	3	2,191
Youghiogheny Valley						5	2	857	3	1,916
Juniata and Conemaugh Valleys						19	11	2 343	8	3,246
Spiegel						1	0	0	1	250
Maryland	7	3	262	4	410	4	2	2,625	2	290
Virginia	19	5	251	14	757	12	9	4,733	3	1,279
North Carolina						1	1	100	0	0
West Virginia	2	0	0	2	130	6	3	2,340	3	840
Ohio—Mahoning Valley						14	11	9,103	3	1,837
Eastern, Central and Northern						17	13	9,519	4	2,202
Hocking Valley						14	5	1,545	9	2,169
Hanging Rock	12	7	465	5	495	13	4	702	9	1,853
Miscellaneous										
Kentucky	1	1	97	0	0	5	3	846	2	720
Hanging Rock										
Western Region and Miscellan'ous										
Tennessee	8	5	1,228	3	260	12	8	3,803	4	1,385
Georgia	3	1	148	2	261	2	2	1,136	0	0
Alabama	14	8	1,556	6	1,429	37	24	14,885	13	8,198
Indiana						2	1	238	1	95
Illinois						15	14	15,429	1	350
Michigan	26	15	5,139	11	2,801	1	0	0	1	300
Wisconsin	6	3	1,569	3	690	4	3	2,463	1	422
Minnesota						1	0	0	1	140
Missouri	2	2	633	0	0	6	2	1,385	4	2,200
Texas	1	1	180	0	0					
Oregon	1	1	234	0	0					
Colorado						2	1	540	1	350
Utah										
Washington	1	0	0	1	205					
Total charcoal and coke	142	67	13,133	75	9,338	243	157	114,411	86	38,436
Total anthracite	174	103	39,689	71	22,343					

SUMMARY.

FUEL.	IN BLAST. Number.			IN BLAST. Weekly Capacity.			OUT OF BLAST. Number.		OUT OF BLAST. Weekly Capacity.	
		Month Previous.	Year Previous.		Month Previous.	Year Previous.		Month Previous.		Month Previous.
Charcoal	67	63	69	13,133	11,644	11.769	76	79	9,378	9,916
Anthracite	103	109	94	39,689	42,441	35,497	71	68	22,343	42,305
Bituminous	157	149	137	114 411	109,982	92,915	86	91	38,846	20,834
Total	327	321	300	167,233	164,067	140,181	233	238	70,567	73,055

LAKE SHIPBUILDING LEADS THE WORLD.

Clyde shipbuilding statistics show that during the month of July 15 steamers, three sailing vessels and five yachts, with a tonnage measurement of 16,765 tons, were launched. The Clyde of course is regarded as the shipbuilding center of the world. The July supplement to Lloyd's register show that 14 vessels, with a tonnage of 15,668, were launched on the lakes. This does not include the Monarch, estimated at 2,000 tons, launched on the Canadian side, making the output of lake shipyards for July 17,668 tons, pretty nearly a thousand tons more tonnage than was built on the Clyde, and in comparing numbers it is seen that the lakes turned out larger vessels. During July the new orders on the Clyde aggregated 8,000 tons in round numbers, the new orders placed during the month on the lakes figured 18,000 tons. This makes the he lakes the leading shipbuilding region on the globe for that length of ti me

The following table showing the shipbuilding productions of the world has been published recently:

VESSELS BUILT DURING 1888 AND 1889.

	1888 No. of Vessels.	1888 Tonnage.	1889 No of Vessels.	1889 Tonnage.
United Kingdom	484	776,993	656	1,180,349
Germany	37	39.994	79	101,984
United States	73	38,198	115	84,832
France	14	10,721	22	42 921
British Colonies	68	17,106	75	27,368
Denmark	5	5,721	20	15,026
Norway	19	11,434	32	14.640
Netherlands	3	5,156	10	11,033
Italy	8	1,798	21	7,861
Sweden	15	4,088	25	7,084
Greece	15	3,086	17	4,319
Austria	5	5,038	6	1,853
Russia	7	1,713	7	1 830
Other countries	12	5.478	5	1.531
Totals	765	926,523	1,090	1,502,629

The figures for the United States do not included the tonnage built on the lakes, which are as follows: For 1888, 59 vessels with a tonnage of 100,950, and for 1889, 56 vessels with a tonnage of 124,750 were built. This puts lake shipbuilding next to that of the United Kingdom, almost doubling the tonnage of the German Empire turned out during the past two years. The number of boats built in Germany during 1888 and 1889 was 116, and on the lakes 115, the same number but having nearly 80,000 more tons, showing that lake boats were on an average one-third larger. Of the 2,429,152 tons shown above 2,064,800 tons were steel, 181,846 iron, 178,824 wood and 3,681 composite.—[Marine Review.

AN order for 20,000 tons of large pipe for Brazil has been placed with a Glasgow foundry.

CARRYING CUBAN IRON ORES INTO VIRGINIA.

The statement is made by the *Virginia Manufacturer* of the 4th inst. that the Norfolk & Western Railroad proposes to import Cuban ore via Norfolk for smelting in furnaces along the line of that road. Cuban ore is claimed to be excellent for mixing with Virginia ore to manufacture Bessemer pig iron; and this importation would furnish freight for the thousands of cars that now carry coal from Pocahontas eastward, and return empty.

We hope our Southern friends will give us some fuller explanation of this matter. We have been told for the last 10 years that Virginia and other Southern States possessed all the ore and the coal necessary to supply the "markets of the world" with iron for ages to come, that the ore and coal were nearer together than anywhere else, and that iron could be produced as cheaply as in England. But now we learn that Cuban ore is excellent to mix with Virginia ore—in other words, that Virginia ore needs some other ore to be mixed with it to improve it. If Cuban ore can be carried into Virginia to meet the Pocahontas coke, it can quite as easily be carried into Pennsylvania to meet the Connellsville coke, and if so, with the exception of the temporary difference in cost of labor, wages in Pennsylvania being higher, the much lauded advantages of Virginia do not seem so very apparent. It has not yet been demonstrated that Virginia has any beds of ore which are equal in quality and extent either to the Cornwall bed in Pennsylvania, to those of the Lake Champlain region in New York, or to those of Cuba, still less to those of the four great Lake Superior regions.

However, we would by no means decry the resources of Virginia. While we do not believe that she is going to supplant either Pennsylvania or Illinois as an iron center, we would not be at all surprised to see her surpass Alabama or even Ohio. The accessibility of the Cuban ore is the one thing which gives her a great advantage over the two last named States.

The fact is, the United States is too large a country to have only one great iron center. No one State has such a monopoly of advantages that it can expect to retain control of the industry. According to the census returns, Pennsylvania increased her production of pig iron in 10 years from 1,930,311 to 4,712,511, or 2,782,200 net tons. Ohio increased from 548,712 to 1,302,299, or 753,587 tons; Illinois from 95,468 to 674,506, or 579,038 tons; Alabama from 62,336 to 890,432, or 828,096 tons, and Virginia from 17,906 to 302,447, or 284,541 tons. Pennsylvania's percentage of the total product of the country decreased from 51.05 to 49.19 per cent, Ohio from 14.51 to 13.59, while Alabama increased from 1.65 to 9 29 per cent., Illinois from 2.52 to 7.04 per cent., and Virginia from 0.5 to 3 16 per cent. Although the percentage of Pennsylvania decreased, its actual increase of production was more than three times the increase of Alabama, and nearly 10 times the increase of Virginia. So, while the increase of Virginia and Alabama has been phenomenal, when reckoned in percentages, the actual figures merely show a tendency to distribution of the iron production among many centers rather than to concentrate it in one.

The importation of Cuban ore is a matter of considerable importance to the iron industry of the whole country as well as of Virginia. If the new mines now being developed should prove as profitable as the Jurugua mines, which shipped over 200,000 tons to this country in 1889, they will make up for the deficiency which is threatened in the Spanish and other foreign ores, and make the Atlantic seacoast one of the best locations in the country for the production of pig iron. The Pennsylvania Steel Co., in building its new works at Steelton, Md., has shown great foresight in this matter.

Assuming that the Cuban mines are going to be a permanent source of a large part of our iron ore supply, the question of the best location for iron manufacture becomes a very complex one. Some locations have one advantage and some have another, but there is no place without its disadvantages. Eastern Pennsylvania is accessible to foreign ores and to the ores of New York and New Jersey, and has its own Cornwall ores, which will supply a portion of its demand only. Its anthracite is not as good a fuel as its Connellsville coke, and that has to be carried a great distance. Its market is close at hand, being the whole of New England, New York and Eastern Pennsylvania. Western Pennsylvania has abundant fuel and access to all markets, but has no iron ore. It always pays the highest price for ore, and is the meeting point for ores from points as distant as Minnesota and Algiers. Its location at the head of the Ohio river is unequaled for giving it command of the markets of a vast extent of territory, and there can be no doubt that as long as its fuel lasts, Pittsburgh will be a great manufacturing city.

The great source of supply of good ores being the Lake Superior region, and the great coke region being that of Western Pennsylvania and Southwestern Virginia, any number of locations may be selected between the ore and the fuel which may be called good ones. Thus Connellsville in the coke region, Duluth, Minn., near the iron mines, and Chicago, Cleveland, Youngstown, etc., between them, are all good locations, each one supplying a certain market, but none able to command them all. Each location has its disadvantages, great distance from either the ore or coal, or both.

In the South, we are told that these disadvantages disappear, and that the coal and the ore lie close together. But the importation of Cuban ores into Virginia throws doubt upon this claim. It also has the disadvantage of being further from a large market than any of the more northern locations named. The great advantage of Virginia is its Pocahontas coke and its accessibility to Cuban ores. In this it is far ahead of Tennessee and Alabama. These latter States have at present the advantage of the cheapest labor and the closest proximity of ore and coal, but neither will the ore compare with Cuban ore nor the coal with Virginia or Connellsville. They can make an ordinary quality of foundry iron, and sell it in competition with Northern irons in Northern markets, but there is not much profit in sending the iron so far for a market, and the great feature of the Alabama furnaces should be in supplying a demand yet to be created in the South itself. The claims that Alabama can make iron as cheaply as England must be received with great caution, and even if it could, it has not England's location on the seacoast by which it can secure a foreign trade. When England's supply of coke and the Spanish and African ore mines are nearly exhausted, then the conjunction of Cuban ores and Virginia coke may make Virginia, but not Alabama, the best iron location in the world; but the day is probably far distant.—[Engineering and Mining Journal.

Mineral Wealth of the Michigan Peninsula.

This rather interesting, if reliable, statement, is taken from the *Iron Ore*, of Ishpeming:

A prominent gentleman of this county, who has been interested in mining affairs for some time past, is preparing a pamphlet descriptive of our mines and minerals, and amongst other things has devoted some attention to what the properties of this peninsula have paid since the time they were first wrought. He finds the total to be about $128,000,000, which amount is within sixteen per cent. of the dividends declared by all the mines of the States and Territories west of the Mississippi River. He, however, does not include the bonanza period of the Comstock mines, but does figure them outside of that phenomenal time. It will be a matter of considerable surprise to know, and we suppose the gentleman has correct data, that this little upper peninsula of the State of Michigan has earned nearly as much in profits as all that vast territory with its numberless precious-metal mines lying to the west of the "Father of Waters," and there are probably very many people who, without having any actual figures to guide them, imagine that the single State of California, or of Colorado, has earned a great deal more than have the mines of iron ore and copper of this peninsula. There are many who will hesitate even now to accept the statement as true, but the figures are to be found, and the gentleman in question has spent considerable time in obtaining them. As yet in infancy as far as the development of its mineral resources are concerned, the upper peninsula has still greater records to make, and greater renown to win. Its mines are the best the world holds, this being true as to iron and copper, it has still a vast unexplored territory that may hold greater wonders than those already revealed. It enjoys the distinction of being situated so that its products can be transported to the great marts of the world, and is going to hold pre-eminence over all competitors for many years to come. It is a great country, a rich land, and we have as yet but fairly started upon the work of its development.

The Famous Kinzua Bridge Doomed.

Kinzua bridge will soon be a thing of the past. The structure is too light to carry the heavy traffic which is being done on that division of the Erie, and is to be replaced with a detour. The Kinzua viaduct, which spans the gorge of Kinzua creek, is over 2,000 feet long and is 310 feet above the water. It was built for a single track, at a cost of $237,000, and consists of 20 towers, each 10 feet by 38½ inches at the top, and of varying width at the bottom, the highest being 103 feet by 38½ feet at the base. These towers are built of iron columns, in 30-foot sections, and connected by internal wrought iron sleeper joints, and is the highest bridge in North America, and, with one exception, in the world. The viaduct was designed to hold a weight of 226 tons, which is equal to a load of 3,075 pounds per lineal foot of track. This viaduct carries a branch of the New York, Lake Erie & Western railroad from the petroleum fields of Bradford county to the coal fields of Elk county. It was begun May 5, 1882, and completed August 29, 1882, less than four months. The viaduct for years has been one of the famous bridges of the world, and has been visited and examined by many eminent engineers and railroad men of this and other countries, and it is probably the only bridge in the world which has just about paid for itself in the amount of excursion business it has brought to the road building it.—[Railroad Review.

Repairing Injectors.

It frequently happens that an injector refuses to work readily and can only be started by persistent effort, the indications being that something is wrong inside. Investigation fails many times to show where the trouble lies, as everything about the injector is apparently in proper shape. When trouble of this kind occurs the fault can generally be located in the nozzles, which have become coated with a layer of incrustation, formed from the sediment and impurities of the water, which adhere to the inner surface of the nozzles, forming a thin, smooth scale. This scale, in spite of its extreme thinness, has considerable effect on the action of some indicators, and is the cause of a great deal of annoyance until removed. It may be easily removed by taking out the nozzle and placing it in a solution of one part muriatic acid, in ten to twelve parts water. This solution will dissolve the scale completely, without doing any injury to the metal. In most cases it is necessary to leave the nozzle in the solution for a couple of hours only, sometimes it may dissolve in less time although at others it may require as much as twenty-four hours, depending principally on the nature of the scale and the strength of the solution; but if the solution is warm its action will be increased. An occasional treatment of this kind will keep the nozzles clean and the injector in good working order.—[Stationary Engineer.

You Should

Avail yourself of the low-rate excursion to Pittsburgh and return via the Cleveland & Pittsburgh Railroad, Sunday, September 21st, on account of the Catholic Congress. Only $3.00 for the round trip. Tickets good returning until September 27th. Special train leaves Union Depot at 11 P. M.

AMONG the industries of New York there are women who can make tins, tools, trunks, trusses, harness, saddles, traveling bags, pocket-books, clocks, jewelry, coffins, wooden boxes for cigars and grocery supplies, and it will be a great oversight if the World's Fair Commissioners do not solicit specimens for exhibition. They are quiet, domestic workers, many the sole supporters of large families, and none of them abreast of the times. It will pay to look after their interests.

FOREIGN IRONMASTERS AMONG THE MICHIGAN MINES.

Iron Ore, Ishpeming, Mich., gives the following information regarding the preparations made for the reception of the British and German ironmasters to the Lake Superior regions in October:

Before coming here the foreign party will have divided, a portion coming from the copper district by rail and the balance by boat. The party coming by boat will leave Marquette at eight o'clock on the morning of October 20th, and will be conveyed to Michigamme, where they will arrive at ten, and where the Houghton contingent coming by rail is expected to reach at the same hour. Here there will be a formal reception after which the mine will be inspected.

At twelve the party will take the train for Champion, reaching that place at 12:30, and will devote half an hour to lunch, then look over the mine until 2:30.

At three Republic will be reached, and here two hours will be put in with the people of that place and the big hard ore mine.

The party will reach Ishpeming at 6:30 in the evening and will remain over night.

At eight on the morning of the 21st, they will be conveyed to the Lake Angeline, reaching that point at 8:20, remaining until 9:40, beginning at the west end of the property and walking to the new workings at the east.

At 9:40 they will cross the lake on the foot bridge, and arriving at the Lake shaft of the Cleveland Iron Mining Co. at 10:10.

At the Lake Superior mine they will spend an hour and twenty minutes, leaving it at 11:50 for the Cliff Shafts, where they will remain until 12:30. Lunch until 1 P. M.

At 1:15 the Cleveland will be reached and visited until 2:30.

The Jackson will be reached at 2:50 and one hour spent there.

The party will reach the Queen at 4:10, remaining until 5, when they will leave the iron range for Marquette.

The latter city will be reached at 6 in the evening and a reception will be held, after which the party will bid us good bye and will reach the "Soo" at 6 the following morning.

MAKING FINE STEEL.

The first step required in transforming iron into fine steel for the manufacture of cutlery, surgeons' implements or military weapons, is the removal of its brittleness, which is largely, if not entirely, due to the presence of phosphorus and carbon in the crude metal.

One process of manufacturing wrought or malleable iron from iron ore is as follows: The ore, being fused in a reverberating furnace, is conveyed, whilst fluid, into an air furnace, where it is exposed to a strong heat until a bluish flame is observed on its surface. The mass is then agitated on its surface till it loses its fusibility and is then collected into lumps, technically known as "loops." The loops are next thrust into another air furnace, brought to a white or welding heat, and then shingled into half-blooms, or slabs. These are again exposed to the air furnace, and afterwards taken out and forged into anconies, bars, half-flats and rods for wire; the slabs being passed through grooved rollers. By adopting this method, it matters not whether the iron is prepared from either cold or short hot metal; nor is there any occasion for the use of finery, charcoal, coke, chafery or hollow fire, or any blast by bellows or otherwise; and all fluxes are dispensed with in every part of this process.

Steel is prepared from wrought (or malleable) iron by fusion, which consists in plunging a cold bar into melted crude iron and keeping it there for some time. By this process the bar is transformed into steel.

All iron which becomes harder by suddenly quenching it in cold water is called steel; and that steel which in quenching acquires the greatest degree of hardness in the lowest degree of heat, and retains the greatest strength in and after induration, ought to be considered the best.

Before steel can be successfully manufactured into edge tools, after it has been forged it must undergo a hardening process; but first the inevitable scale must be removed from every part of the tool. For this purpose it should be passed immediately from the hands of the forger to the grinder. A slight application of the stone will remove the whole of the scale, and then the process of hardening can be performed more satisfactorily. In this operation the lowest possible degree of heat at which the steel becomes hot is undoubtedly the best. The plunging of it into cold water after every part has been uniformly subjected to the proper heat removes the obstacles from the surface and allows the process of hardening to be equally thorough throughout the entire tool.

With these preliminaries, we proceed to another process for making the finer qualities of steel, although the result of the foregoing methods is the production of a good material for the manufacture of razors.

Remembering that the removal of the usual brittleness from the iron to be used, and giving to it the proper degree of hardness, are essential to the production of a good steel, and having already shown how the latter may be best accomplished, attention is called to the manner in which all may be done. This may be effected in the wrought iron before its transformation into steel or afterwards.

"It is well known," says the *Mining and Scientific Press*, "that if a piece of the very best and toughest iron is hammered in the process of forging until it ceases to be red-hot, the effect of such cold hammering, as it is termed, is to cause the iron to become so brittle that it will in many cases break across in the process—or if it does not at that time, this process of cold hammering so removes and destroys its tenacity as to render it capable of being broken with the slightest blow. In remarking upon this process, Mr. Nasmyth, the well-known authority, expressed the opinion that, though such a practice is by no means to be considered inherently wrong, but just the reverse, the evil rests in applying such a cold-hammered piece of forge work to its purpose without having been passed through the curative process, which is simply to heat the piece of work in question to a dull red heat and lay it down to gradually cool. By subjecting wrought iron to the most violent hammering or compression at a low temperature, and then submitting the iron work so treated to the simple process referred to—heating red-hot and slowly cooling—the tenacity or shock-sustaining qualities of the article are enhanced twenty times."

The iron, having been purged of its brittleness, is first reduced to filings, which are next brought to a red heat in a crucible. A bath of pure oil of olives, into which melted lead has been thrown, should be in readiness, and into this is placed the melted iron. Care should be taken to cover the vessel containing the bath every time the iron is put into it, to prevent the ignition of the oil. In this bath the iron is steeped four or five times—alternately and gradually cooling and heating it. It is then ready for forging into edge tools. This is the celebrated Damask steel.

If, upon trial, the steel tools are found to be of too brittle a quality, plunge them into boiling fat for two hours; then take them out and let them gradually cool. They will be found to have lost their brittleness, while retaining the requisite hardness.

London *Engineering* records the successful experiment of the Chatillon-Commentry Steel Co. in tempering steel gun tubes, projectiles and armor plates with lead: "The process is simple, the steel being raised to a red heat and then plunged into a both of molten lead, where it is allowed to cool gradually. The beneficial effects of this treatment are very marked, the elastic limit, breaking stress and percentage elongation of the material being all increased."

There are other forms of transmuting iron into fine steel, and of hardening and tempering both iron and steel, but possibly none better than the processes here described.

They are not altogether new, having been tried, and, so far as known, are not patented. We give them to the public for further development.—[Journal of Commerce.

The Powerville Felt Roofing Company.

Is it not refreshing to note that, in these days of trusts, pools and combinations, the Powerville Felt Roofing Co., Limited, in manufacture and sales of its products, stands free, unrestricted and independent, with the whole country for a market? With ample facilities in all its various departments, this company fully realizes that this is the age of progress, and has relegated to the past all old processes of manufacture which have been proved of doubtful value, and, under patented improvements of its own, is manufacturing a line of carbonized felt roofings and sheathing papers of acknowledged superiority. The Powerville Felt Roofing Co. believes in the truth of the old adage, "Best goods sell the best" Manufacturing under this principle, its annual sales have steadily gained, and its goods are now in active demand throughout the country. Representatives in Pittsburgh, St. Louis, Chicago, Detroit, Kansas City, Portland, Ore., San Francisco and other important cities South and West, handle "Powerville Brands" with great satisfaction to the trade. Powerville carbonized felt roofings are now largely exported to Southern latitudes and a strong and active foreign demand has been created. All who have used this brand of roofings commend their permanent qualities, as well as their ability to stand long sea voyages and climatic influences. From the beginning of the enterprise down to the present time this house has been persistent in its determination to excel in all details of manufacture, and all its transactions have been governed by a strict sense of high commercial honor and integrity. This company owns its own dry felt mills and water power, controls its own dry saturating and tarring plant, its own distilling works for manufacture of pitch and coatings, also contracts for an ample supply of coal tar; thus it is beyond the adverse work of combinations and does not fear boycots or competition. The principal office of the company for Michigan is at 192, 194, 196 and 198 High street west, Detroit, Mich., and Eberts Bros., so long and favorably known to the trade, has charge of the Michigan sales department. Descriptive catalogues and price lists containing interesting and useful information will be furnished upon application.

Curiosities of Electric Welding

The British Association for the Advancement of Science has this week been holding its annual meeting at Leeds. Sir Frederick Abel's presidential address to the scientists in tracing the progress of electricity since the Association met at Leeds in 1858 referred to electric welding. The successful practical realization of Joule's predictions in regard to the application of electric currents to the welding of iron and steel, and to analogous operations, through the agency of the efficient machines devised by Professor Elihu Thomson, was demonstrated to members of the Association by Professor Ayrton two years ago, and was shown on a larger scale to visitors at the Paris Exhibition last year, and recently highly interested audiences in London by the late president, Sir Frederick Bramwell. At the Crewe Works Mr. Webb is successfully applying one of these machines to a variety of welding work. With such practical advantages as these, electric welding bids fair to receive many useful applications. Another very simple system of electric welding, especially applicable to thin iron and steel sheets, hoops, etc., has been contemporaneously elaborated in Russia by Dr. Bernados, and is already being extensively used. The required heat at the surfaces to be welded is developed by connecting the metal with the negative pole of the dynamo machine, or of a battery of accumulators, the circuit being completed by applying a carbon electrode to the parts to be heated. This mode of operation appears to have been practised upon a small scale some years ago by Sir William Siemens, to whom we also owe the first attempt to practically apply electric energy to the smelting of metals.—[London Iron and Steel Trades Journal.

FEED-WATER HEATING AND PURIFYING.

From a recent work on "Steam Boilers," by Mr. G. B. N. Tower, supervising inspector of the American Steam Boiler Insurance Co., formerly chief engineer U. S. Navy, and instructor in engineering at Dartmouth College, we quote the following:

"Heaters are a most valuable adjunct to a boiler. In addition to the economy of fuel arising from their use—owing to the high temperature imparted by them to the feed-water—there is a still greater benefit obtained in the most improved varieties, viz.: the removal of the greater part of the impurities from the water before it enters the boiler, thereby preventing the formation of heavy incrustation or deposit, again, some of them, are so arranged in addition that they act as condensers, which adds still more to the economy attained by their use."

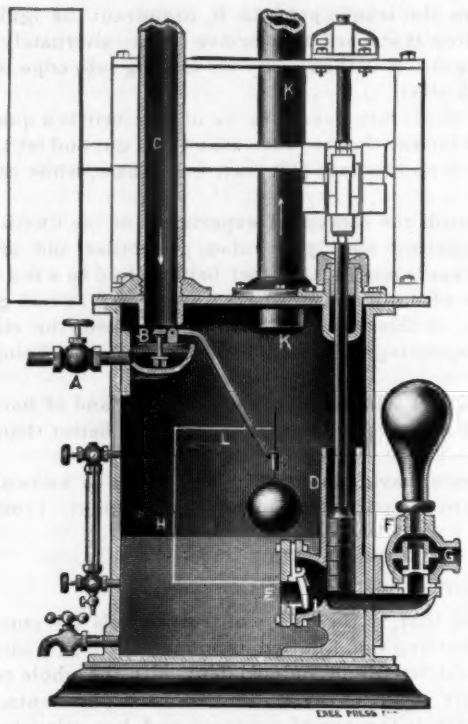


FIG. 1.—SECTION SHOWING INTERNAL ARRANGEMENT OF PARTS.

A—Feed-water Inlet.
B—Spraying Plate.
C—Exhaust from Engine.
D—Pump.
E—Suction Valve.
F—Outlet Valve.
G—Pipe to Boiler.
H—Water Level.
K—Exhaust from Heater.
L—Door.

The Rice patent feed-water heater and purifier, combined with the pump herewith shown, is what is styled an open heater, mingling the exhaust steam with the feed-water, and giving up the latent heat in condensing; thus increasing its fuel-saving capacity, and not having to heat through tubes or other obstructions. This being the only heater with inside pump, makes it more compact than any other, saving the room ordinarily taken up by a pump, saving any loss by radiation, enabling the user to dispense with any packing around the plunger, which will do no harm if it does leak; and pumping the hottest water as easily as another pump does cold water.

Referring to Fig. 1, the feed-water from the source of supply enters the heater by the inlet (*a*), and through a perforated plate (*b*) is sprayed against the exhaust steam, coming through pipe (*c*). Part of the exhaust steam condensing and mingling with the water, boils the latter with latent heat given up in condensing, and the "scale" settles on the sides of the heater, whence it is easily removed. The purified water is then put into the boiler at the highest possible temperature, (212°F.), by the pump (*d*).

Effective working and durability are prominent characteristics of the construction. All parts are made of good material and fitted up with thorough workmanship. The heads, shell and doors are of cast iron, all the joints being faced truly to fit. The joints between shell and heads are made with cement; those between shell and doors with rubber. The large, plain surface inside, without obstructions, and very accessible through the doors, allows the scale

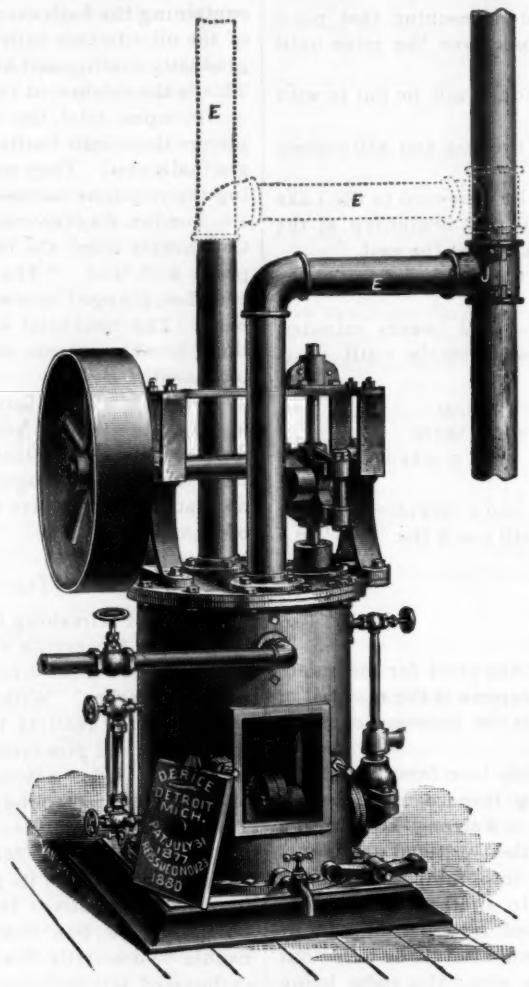


FIG. 2.—SHOWING BELT PUMP, RUN BY BELT AND PULLEY FROM SHAFTING.

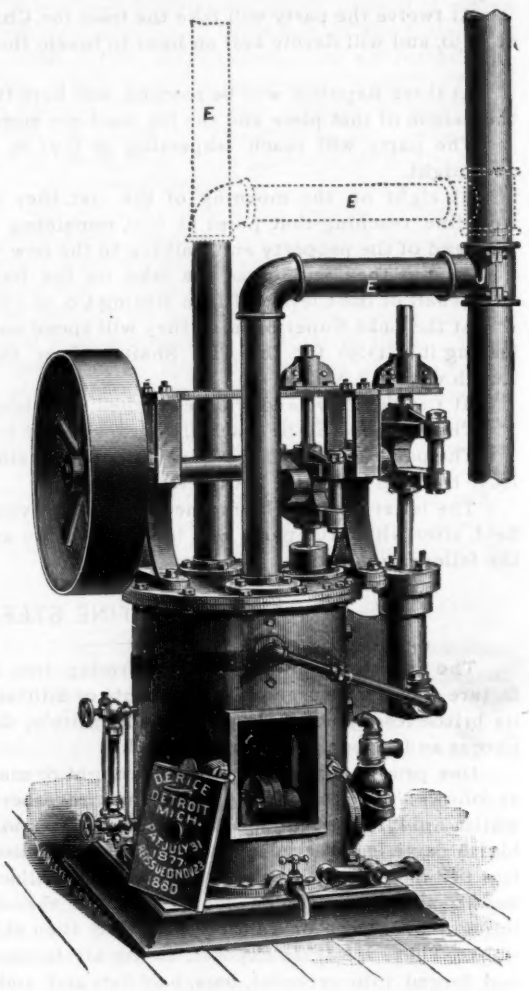


FIG 4

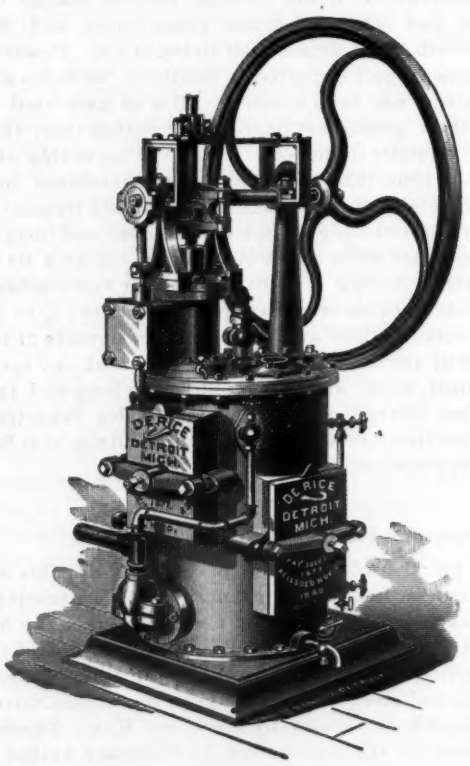


FIG. 3.—STEAM PUMP.

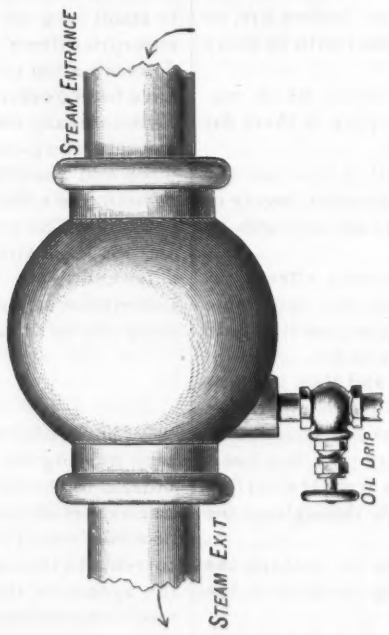


FIG. 5.

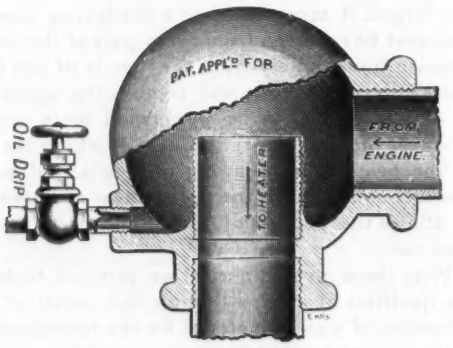


FIG. 6.

The plunger is simply a solid piece of round iron, fitted to the barrel of the pump with grooves turned in the plunger so as to form a perfect water packing. The rod is of wrought iron. The pump is worked by the crank and sliding boxes in the yoke. These are fitted up thoroughly and have large wearing surfaces.

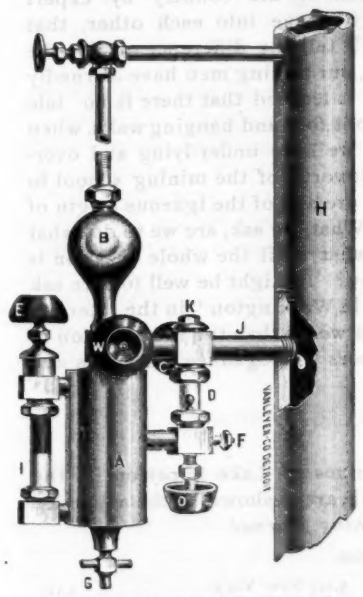
In Fig. 3 a steam cylinder is put on in place of a shaft and pulley, to drive the pump. This arrangement is got up for parties who wish the benefit of a pump when the engine is not in use, as well as running, or where there is no engine or means of driving the pump. Sometimes it is also difficult to get a

belt to run the pump, and in such cases this independent cylinder will be the thing. If used in connection with an engine, the exhaust from it will heat the water as hot as the other style, as they are both made alike, except being driven with belt or cylinder. For hotels and public buildings, where small power is wanted, this style can be made useful, and for fire purposes, at mills, factories and public buildings, it can be used to good advantage. When buildings are heated by steam the drip water can all be carried back to heater and boiler, saving pure water and the nuisance of hot water draining.

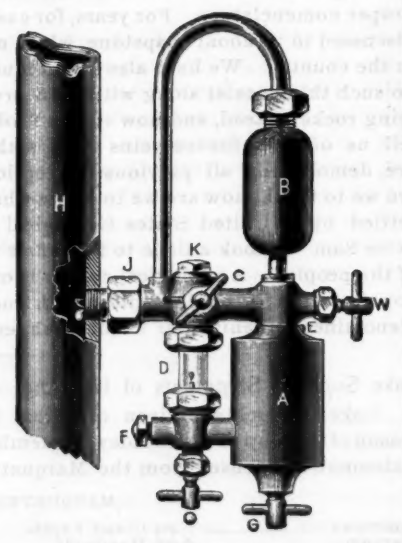
Fig. 4 shows the regular style of heater, with an outside lift pump, making a cheap and simple arrangement for driving both lift and force pumps with one belt. With this arrangement water can be drawn from well and put directly in the heater or elevated into a tank, or both, as desired. Those desiring to exclude oil from going into the heater or boiler, can do so by using the "Oil Extractor." Fig. 5 is for straight pipe, either perpendicular or horizontal; and Fig. 6 can be used in place of an elbow, as shown by the cuts. If oil is wanted to go into the boiler, this can also be accomplished by shutting the valve in the drip pipe. For further particulars address Rice & Blunt, exclusive sales agents, foot of Antoine street, Detroit, Mich.

CYCLONE AND SUCCESS SIGHT FEED CYLINDER LUBRICATORS.

The accompanying cuts illustrate the Michigan Lubricator Co.'s Cyclone and Success sight feed cylinder lubricators for cylinders or steam engines, which have gained such an extended popularity throughout this country, and even in Europe, where the company have obtained a fairly large trade. This is owing to the many superior points of detail their lubricators embrace, as the Cyclone is constructed to combine in the details relative to the sight feed glass. Provisions are made for its perfect and speedy drainage by constructing the arms holding the glass so that plug K may be removed at the top and drain valve F opened at the bottom, thus attaining a passage directly through the sight feed glass, affording the engineer absolute control of the sight feed glass, and permitting it to be renewed, cleaned or drained while the engine is running without emptying the oil reservoir. By removing plug K, the sight feed glass may be wiped out, and at the same time filled with water to prevent waiting for water of condensation, or, if preferred, dry steam can be rushed



CYCLONE.



SUCCESS.

through the sight feed glass by closing valve O, opening valve C and drain valve F, thus cleaning the glass without removing plug K. This lubricator is finished in a variety of styles, enabling them to compete with all makes. The valve stems, packing nuts and every part is constructed in a heavy, substantial manner, at the same time conforming to an outline which gives the lubricator great beauty. This cup fills rapidly, having a ¾-inch filling glass, which is vented at the rim of filler, thus obviating much trouble and delay.

The Success lubricator is a recent invention and is especially adapted for traction portable engines and steam pumps. The sight feed glass can be cleaned, drained or renewed while engine is running without emptying the oil reservoir or condenser, and is the first and only single connection sight feed lubricator introduced that proved perfect under the severest tests, as it cannot spray or feed its oil into the condenser, and can be drained for refilling without emptying the condenser, unless desired. This company manufacture a full line of steam engine trimmings, all for the purpose of applying lubricants, and have just taken out a valuable patent which will enable them to place on the market the finest locomotive cylinder and air brake lubricators yet produced. For further particulars, address the manufacturers, the Michigan Lubricator Co., Detroit, Mich.

Prefering Iron to Steel for Boilers.

We have several times lately found railroad men who expressed a preference for good iron sheets for the shells of boilers, rather than the steel that is becoming almost universally used. Every man is entitled to freedom of opinion in matters of this kind, but we feel assured that the consensus of practice and enlightened opinion tend to prove that the men who are using iron for this purpose are not acting in the best interests of the railroad companies they serve. It took some men a long time to learn that steel was much preferable to iron for fire-box sheets, and their devotion to iron was in some instances an exceedingly expensive error of judgment. There is good reasons for believing that obstinate preference for iron boiler shells will in the end prove more expensive to railroad companies concerned than the iron fire-box did. The man who prefers iron to steel sheets is generally one whose range of experience is limited, and whose oportunity for seeing the comparative value of the metals properly tested have been insufficient.

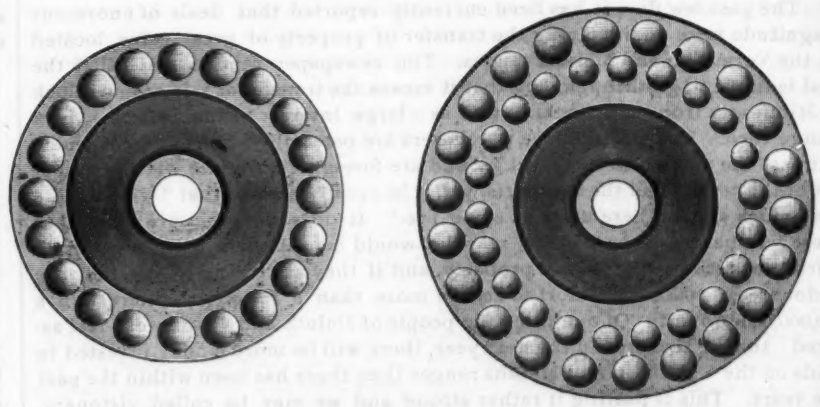
The advocate of iron will generally tell about some boiler that was in constant service for 30 years, at the end of that time was broken up, and after the long period of work the sheets were found fairly free from corrosion and of high tensile strength. This is a practical argument that appears convincing but investigation proves it to be misleading. Steel possessing the most valuable physical qualities of the fine iron sheets, rolled in the early days of locomotive history, may now be made at much lower cost than first-class iron, and in consequence of this high class iron sheets are not now rolled. It is doubtful if ever iron sheets, with the greatest care and labor that could be bestowed upon their production, were of the uniform high quality common with carefully manufactured steel sheets. Advances in methods of manufacture and in means of making physical and analytical tests have led the engineering world to decide that steel is the material best adapted for boilers required to carry steam of high pressure.

Years ago a committee of the Railway Master Mechanics' Association reported in favor of steel for locomotive boilers, and the association endorsed the recommendation. Lately the American Boiler Manufacturers' Association have given official recognition to steel as the proper material for boilers. There is no inclination displayed by any authorities on boiler making to return to the use of iron. This being the case, it is foolish for isolated individuals to cling to a preference that is not sustained by the experts whose opinions might be asked for in case of accident. The man who builds an iron boiler and subjects it to the high pressure of steam becoming common is taking upon himself a grave responsibility.—[National Car and Locomotive Builder.

WARE'S PATENT ANTI-BURSTING FLANGES.

The accompanying illustrations represent two sizes of the anti-bursting flanges, recently patented by E. R. Ware, and which are claimed to be a sure protection against accidents from the bursting of solid emery wheels and grindstones. Indeed, as claimed, they not only insure perfect safety to life but they greatly reduce cost. In connection with these devices a pertinent question arises, "Why do solid emery wheels burst?" The general supposition is, because the bond which holds the emery together is not strong enough to resist the centrifugal force or velocity at which they are driven. Obviously, this may have something to do with the matter, but careful examination and severe tests of the leading wheels, convince us that not one accident in a thousand occurs from this cause. Carelessness of the operative is also adduced as a reason. Admitting that some are careless, this reason will cover less cases than the first. Severe tests, under a great variety of circumstances, show that no wheel is exempt from liability to burst. They also show that no manufacturer has been so foolhardy as to use a bond that does not contain sufficient binding qualities to stand the strain of centrifugal force alone, at several times their rated speed.

The only logical solution of the matter is, that in mixing the matter and during processes of hardening, there will be liability of cracks, weak spots, etc; then again when flanged with ordinary flanges, the constant jar and succession of shocks to which the wheel is subjected, causes disintegration, and sooner or later the wheel flies to pieces. Various devices have been devised



and used, such as coiled wire, wire webbing, etc., but until now none have been successful in the proper sense of the word. Protection to protect, must be applied from without, not internally, by a method which, in the event of an accident, simply divides the wheel into more pieces than if left out. The devices, as shown, combine safety and economy, and should be used on all wheels. The inventor claims for this construction the following points in the matter of safety: We distribute the bearing surface of the wheel over a large area of diameter, holding it almost entirely by pressure of the elastic cushions upon the sides of the wheel. In the event of breakage it is almost impossible for the pieces to escape. The circular form of the cushions, the pressure from the confined air in the chambers underneath the cushions and the rubber itself, form the most powerful grip conceivable, and at the same time constitute an elastic cushion upon which the wheel rides easily and safely at a high rate of speed without danger to the operative.

Cut No. 1 shows large flange which is used when wheel is new or first put on.

Cut No. 2 shows small flange which is used after wheel is worn down too small for the large one.

Further information may be had from the manufacturers, West Side Machine Co., Worcester, Mass., or from E. R. Ware, 162 LaSalle street, Chicago, Ill.

AMONG THE IRON MINES.

Lake Superior Mining Notes:—

MARQUETTE RANGE.

At the Republic mine the four compressors have not been retarded for want of power during the entire year. Previously there had been much trouble had by reason of sufficient water power to drive the compressors and steam had to be used in addition to the water. To obviate this trouble a dam was constructed some time ago, which has held the water in reserve so that it has been let down in dry times according to the amount wanted. In this way a constant working pressure has been maintained and no loss of time occasioned as used to result before the reservoir was built. The Repuplic has not sent its usual amount of ore forward from lake ports this season, and will not produce as much this season as for many years past. A short time ago the mine was looking poorly at one point, but lately there has been a decided improvement. Like many other hard ore properties the Republic has its times of depression, but it always recovers its good health, and manages to close the year with a good record.

Since 1872 it has produced 3,531,541 gross tons, which is a good showing, and the quality of the ore has been of the best. At the head of the mining work Capt. Peter Pascoe has stood for the past nineteen years, and that he has earned the credit of being one of the best in his profession none will dispute. He probably entertains no fears that the "old reliable" will soon come to the end of its tether. The Republic possesses a remarkably strong formation, one that will continue to hold its ores for a long time into the future, and Capt. Pascoe well understands how to get the store of ore at the quickest moment and for the least possible cost.—[Iron Ore, Ishpeming.

GOGEBIC RANGE.

The big Norrie is now 97,179 tons ahead of the Chapin, the latter having 472,355 tons, the former, 569,534 tons. Those who have bet new suits of clothes upon the Gogebic favorite stand a fair chance of winning. Both mines have credits in the way of all-rail shipments which do not appear in our tables, but they are supposed to favor the Norrie. Both are sending out enough.—[Iron Ore, Ishpeming.

Capt. W. L. Dickinson, well known in Ashland, and the present superintendent of the great Colby iron mine, has, it is said, resigned that position, and will leave the employ of the Colby syndicate on October 1. Capt. Dickinson, who is one of the oldest and best known mining men on the Lake Superior region, has been engaged to take charge of some Cuban iron properties in which Ely, the Cleveland mine owner, is interested. He will leave for Cuba in the Fall. Capt. Dickinson was many years superintendent of the New York mine, on the Marquette range, and later had charge of the Commonwealth mine near Florence. He took charge of the Colby two or three years ago. He is known throughout the country as the father of Willie Dickinson, the boy who disappeared so mysteriously from his home near Florence a number of years past, and has never been heard from since.—[Ashland Press.

It is said that there has been a find of ore at the old Richard's property on the Cascade range that is attracting the attention of mining men of this field. The property is one that has been explored for years past without finding anything further than "good indications," and it is hoped that the long-looked-for bonanza has at last been found. The Cascade range is one that is now receiving considerable attention, and is giving good encouragement for the prosecution of development work.—[Iron Ore, Ishpeming.

VERMILION AND MESABA RANGES.

The past few days it has been currently reported that deals of enormous magnitude were on, involving the transfer of property of great value, located on the Vermilion and Mesaba ranges. The newspaper reports state that the deal is liable to go through, and that it means the transfer of a $6,000,000 block of Minnesota Iron Co.'s stock, as well as a large interest in the Duluth & Iron Range road. It is said that the purchasers are ostensibly Chicago gentlemen, but that the parties in the background are foreigners. While we very much doubt the truth of all these reports, yet, it is equally certain that "where there is so much smoke there must be some fire." It does not seem probable that these purchasers, whoever they may be, would be satisfied with less than a third interest in so valuable a property, and if they are trying to buy, they are undoubtedly making an effort to secure more than a $6,000,000 interest in a $20,000,000 property. Of one thing the people of Duluth and vicinity can rest assured: that is, that within the next year, there will be more money invested in lands on the Vermilion and Mesaba ranges than there has been within the past five years. This is putting it rather strong and we may be called visionary, but the statement has a good solid foundation beneath it and is, we believe, perfectly safe. Many causes have combined to retard the development of these ranges and deter capital from investment, and even from investigation. These causes are gradually being done away with, and the true worth of the country is becoming known. This of itself is a sufficient reason for saying that capital will invest; for it is certain that capital knows a good thing when it sees it, and there can be no argument over the proposition that capital sees a good thing when it looks over the Minnesota iron ranges. You will hear something drop in this section before long, and it will be something of a surprise to all.—[Lake Superior Mining and Manufacturing Review.

MENOMINEE RANGE.

An exploration which is being conducted by Iron Mountain parties on the northwest quarter of the southeast quarter of section 8, 39-19, this county, gives every indication of developing into a mine at a very early day. The gentlemen interested in the enterprise are John Minnis, Josiah Davey, Frederick Flatt, Richard White, Peter Calvi and Joseph Bitterly, all of whom are well-known residents of the metropolis of the Menominee range. They obtained their option on the 20th day of last July, and have been steadily conducting exploratory operations since that time, their labors resulting in an exceedingly rich find of ore. They commenced work in the deep shaft, at what is known as the old McDonald exploration, and started to cross-cut at a depth of forty feet from the surface. The shaft is sunk through a solid mass of ore, and the cross cut is eighteen feet in ore, and the hanging wall has not yet been encountered. The ore in the drift assays from 58 to 61.13 in metallic iron, and is of a non-Bessemer, red hematite quality. When the property was under option by Mr. McDonald, those in charge of the exploratory work at that time labored under the impression that the vein dipped to the south, but recent developments demonstrate the erroneousness of that theory; it dips to the north. This mistake proved a fatal one to the McDonald party, for they expended much time and money in a fruitless search for the true vein. The find shown up by Mr. Minnis and his partners is one of the most important made this season in this part of the country. It is only about three-quarters of a mile distant from the North-Western tracks at Spread Eagle station, and about that distance from the route to be traversed by the new Schlesinger road. A company will be formed within a week or two, unless the property is in the meantime sold to Milwaukee capitalists who have an eye upon it. A force of six men is at present employed at the new mine and hoisting is done by what is called a "whip." John Minnis is in charge of the work. There are over 300 tons in stock.—[Florence Mining News.

Ore has been struck on the second level at the Mansfield. The second, or lower level, is about 150 feet from the surface and some fifty or sixty feet below the first level. The ore was encountered in the drift about fifty-six feet from the shaft, or fourteen feet nearer than upon the first level, where the ore was found at a distance of seventy feet from the shaft. Allowing ten feet for the natural dip of the ore formation, this would indicate a gradual widening of the vein. The Mansfield will undoubtedly start in next Spring with a 50,000-ton stock pile, and will easily ship 100,000 tons or more during the season of 1891. About 25,000 tons will be forwarded this year, which is doing pretty well for a youngster only a year old. The Mansfield, however, is a lusty, healthy infant.—[Florence Mining News.

The Lake Region and the Geological Survey:—

Thirty million dollars worth of iron ore is about the annual output of the Lake Superior basin, and yet we receive no attention from the United States Geological Survey. The geology of the iron district is very confusing and distracting to an amateur, and we really need a petiographical, lithological, microscopical and the geological examination of the country by expert scientists. Our ores and rocks so gradually merge into each other, that nothing but close scientific examinations will tell the difference or give the proper nomenclature. For years, for example, our mining men have learnedly discussed to us about soapstone, when now it is learned that there is no talc in the country. We have also heard much about foot and hanging walls, when no such things exist along with iron ore, but we have under-lying and over-lying rocks instead, and now comes Prof. Wadsworth of the mining school to tell us of true fissure veins filled with iron ore and of the igneous origin of ore, demolishing all previous conceptions. What, we ask, are we to do, what are we to think, how are we to know what is what until the whole question is settled by a United States Geological Survey? It might be well to here ask "Our Sam" to look a little to this affair while in Washington "in the interests of the people." A geological survey is of more worth than the introduction of hopeless bills for public buildings in such places as Negaunee, Escanaba and Menominee.—[Peninsular Record, Ishpeming.

Lake Superior Shipments of Iron Ore:—

Lake shipments of iron ore from the mines of Lake Superior, for the season of 1890, up to Wednesday, September 10th, are as shown by the appended statement, condensed from the Marquette *Mining Journal*:

MARQUETTE RANGE.

American	202	Grand Rapids	5,245	New York	2,423
Barnum	6,098	Humboldt	15,633	Pitts. & L. Angeline	189,551
Buffalo	60,665	Imperial	17,614	Prince of Wales	18,705
Cambria	52,408	Jackson	82,691	Prout	9 336
Champion	170,463	Lake Superior	209,363	Queen	75,594
Cleveland	175,230	Lillie	24,718	Republic	135,414
Cliffs Shaft	123,674	Lucy	35,599	Republic Reduction Co.	2,559
Detroit	4,058	Marquette Ore Co	1,910	Salisbury	65,123
Dexter	1,721	Michigamme	44,771	South Buffalo	92,285
East New York	21,524	Milwaukee	23,182	Volunteer	91,694
Fitch	6,049	Negaunee	49,853	Winthrop	62,261
Total, Marquette Range					1,877,992

MENOMINEE RANGE.

Aragon	20,891	Hamilton	16,443	Paint River	39,726
Armenia	20,916	Iron River	96,976	Perkins	6,059
Chapin	472,355	Ludington	60,162	Pewabic	10,967
Commonwealth	78,478	Mansfield	6,430	Shafer	35,480
Cyclops	42,249	Mastodon	47,922	Sheridan	595
Dunn	93,860	Mastodon South	514	Vulcan	87,871
Florence	143,877	Millie	22,631	Youngstown	28,233
Great Western	55,876	Monitor	12,831		
Half and Half	383	Norway	47,109		
Total, Menominee Range					1,448,924

GOGEBIC RANGE.

Anvil	22,105	Father Hennepin	9,634	Odanah	1,666
Ashland	294,117	Federal	9,836	Pabst	81,003
Aurora	161,296	First National	105	Palms	19 657
Brotherton	49,944	Germania	27,562	Ruby	6,781
Cary	51,018	Iron Belt	75,980	Section 33	70,607
Colby	145,910	Montreal	6,630	Superior	20,217
Davis	564	Mt. Hope	43,718	Trezona	35,659
Eureka	19,216	Norrie	569,535	Windsor	20,417
Total, Gogebic Range					1,737,045

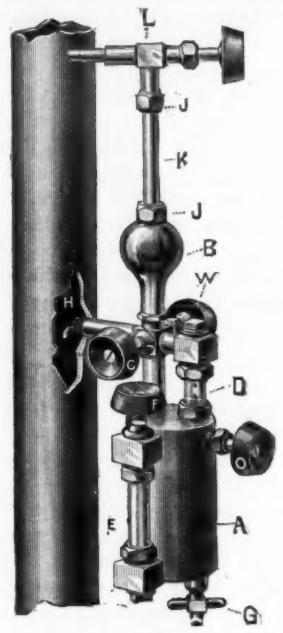
VERMILION RANGE.

Chandler	247,679	Minnesota Iron Co	379,862	Pioneer	5,928
Total, Vermilion Range					633,469
Grand Totals					5,697,430

Lake shipments of iron ore to date are 428,444 tons in excess of the shipments at the same stage of the season last year, showing a falling off in the gain made in the early part of the season. The larger part of this is chargeable to the delay caused by the accident to the lock at the "Soo," but the mines are not shipping at present any more heavily than they were a year ago at this ime, and will have to be favored by good weather from this on or the margin over last year will be pretty much wiped out by the close of navigation.

THE ACME AUTOMATIC SIGHT-FEED LUBRICATOR.

The following points of superiority are claimed for the Acme automatic sight-feed lubricator, herewith shown: They will feed any kind of oil, no matter how heavy. They contain no tubes, consequently cannot be stopped up from the use of heavy or dirty oil. The location of the sight-feed glass (being on top of the oil reservoir) is such as to allow all the oil being used before refilling, and observing the feed at a great distance. There is an air vent in top of oil reservoir which allows the air to escape while filling, and prevents breakage of glasses and expansion; also, a large drain valve for drawing off the water, thus saving annoyance and time. The glasses are put in by simply removing plug over glasses. Its construction is so arranged that it will com-



mence to work immediately on being attached, and will work with connections as short as six inches. It is connected to the steam pipe by their slip-joint connection, which facilitates the location of the cup, and permits a readier and freer connection. Should a mistake of two or three inches occur in drilling hole in steam pipe, this construction allows due compensation therefor, and prevents all leakage that occurs by contraction and expansion that exists in other cups where the slip-joint cannot be used. It will work on the steam pipe, steam chest, or cylinder. The manufacturers say they will put one of these lubricators on any machine on trial in competition with any other lubricator. For further particulars address the Acme Lubricator Co., 607 and 609 Front Street West, Detroit, Mich.

WHERE IS ALL THE IRON GOING?

The census statistics of the production of pig iron for the year ending June 30th, 1890, which we published last week, showing the enormous aggregate of 9,579,799 net tons, call renewed attention to the extraordinary development of our iron industry during the last few years, and raises the question, What becomes of all the iron? Previous to 1880 the answer was easy—"the railroads take it;" for the consumption of iron and steel rails alone, not to speak of iron used in other shapes by the railroad companies, constituted more than one-third of the whole iron consumption of the country. Mr. Swank's statistics of consumption, which are made by adding to the production the tonnage imported each year, and making proper correction for differences in stocks at the beginning and end of the year, show that from 1864 to 1879, inclusive, the consumption of iron and steel rails was more than one-third the consumption of pig iron, and that in 1871 and 1872 it was more than one-half. In 1880 the proportion of rails to pig iron dropped to less than one-third, overreaching it again, however, in 1881 and 1882, but dropping below it in 1883, becoming less than a quarter in 1884 and less than a fifth in 1889. The following table shows the consumption of pig iron, iron and steel rails, and the difference between them for the years 1879 to 1889, inclusive.

	Pig iron.	Iron and steel rails.	Difference.	Approximate consumption other than rails.
1879	2,829 429	996,604	1,833,325	1,684,000
1880	4,589,848	1,458,003	3,131.845	2,936,000
1881	4,562,103	1,948,812	2 613,291	2,366,000
1882	5,119,368	1,803,517	3,315,851	3,089 000
1883	5,029,112	1,332,966	3,696,145	3,514,000
1884	4,381,040	1,030,159	3,350,881	3,197,000
1885	4,196 485	981.181	2,215.304	3,069,000
1886	5,945,603	1,611,044	4,333.959	4,094,000
1887	6 836,067	2,216,683	4.619,384	4,298,000
1888	6,815,255	1,540,724	5,274,531	5,064,000
1889	7,780,369	1,545,481	6,233,888	6,005,000

The last column is made from the one headed "Difference," by subtracting from the latter 15 per cent. of the rail production each year, as an estimated allowance for waste in conversion from the pig iron to the rail. Any error in this estimate will not seriously alter the figures in the last column, which fairly represent the amount of iron used in the United States for other purposes than the manufacture of rails.

The figures for 1879 look small compared with those of the succeeding years, but they were larger than those of any preceeding year, the nearest approach to them being in 1874, when the approximate consumption other than rails was only 1,496,000 tons.

A glance at these figures shows that the consumption of iron for other purposes than rails in 1889 was over four times as great as in 1874, over three times as great as in 1879, and over twice as much as in 1882; that in the eight years from 1872 to 1884 the consumption doubled, and that in the seven years from 1882 to 1889 it doubled again. The census figures for the production of pig iron for the year ending June 30th, 1890, indicate that the year 1890 will show a rate of increase greater than that of any preceding period. This most extraordinary and persistent increase in the use of iron for other purposes than rails is a phenomenon of no trifling importance. It indicates either the progress of a revolution in constructive methods or a tremendous increase in the wealth of the people, or both. We are inclined to believe both causes contribute to the result.

The country is growing richer at a wonderful rate, and strong, durable and therefore expensive structures are replacing those of temporary character, used when money was not so plentiful. In years gone by the chief idea of the American engineer in designing structures was to make them light, and to economize iron and steel to the utmost degree. Waste of metal was looked upon almost as a crime. Now, however, we seem to be approaching English practice, in making strength the first consideration and cost the last. This tendency of itself is enough to account for a great part of the increase in the iron consumption.

But there is also in progress a substitution of iron and steel for wood, stone and brick to an extent hitherto unknown. The era of tall buildings is calling for iron and steel structural shapes to replace the other building materials. We are informed of a 10-story building now being erected in New York, in which the walls are only 12 inches thick. Real estate is so exceedingly valuable in New York that floor space must be economized to the utmost, as offices are rented at the rate of $2 and upwards per square foot per year. It is estimated that in such a building $5,000 a year more rent can be obtained if the walls are made only 12 inches thick than if they were 24 inches thick. To make such a building with 12-inch walls would be an impossibility with wood, brick or stone. Hence the necessity of using steel. The whole building is made of 12-inch channel and I-beams, and the spaces in the frame filled in with brick. The floors, stairways, etc., are also made of iron, with firebrick filling.

No doubt the greater part of the increase in consumption of iron is due to this demand for high buildings, and the necessity for such buildings being a permanent one, the increase is likely to continue at its present rate for some time to come.

Mr. Swank's statistics have been so admirable in every respect that it is difficult to criticise them; but we think it is time, now that rails constitute only one-fifth of the total consumption of iron, that the statistics should show more clearly than they do where the iron goes to. The pig iron might be clasified foundry, forge and steel, and the rolled iron and steel other than rails and nails into plates (say over one-eight inch thick), sheets (under one-eight inch), structural shapes, including beams, angles, channels, etc., wire billets or rods, and other shapes. Rails themselves should be divided into ordinary shapes and street and mine rails. If these classifications were made the statistics would be more valuable, and they would furnish an answer to the question, "What becomes of all the iron?"—[Engineeeing and Mining Journal.

Steel in Lake Steamship Hulls.

As an indication of the class of material employed in the construction of some of the big steel steamships of the lakes some tensile tests of samples are quoted below. The samples were all of Otis steel used in the hulls of boats recently built by the Globe Iron Works Co., and the tests were made by officials of the United States steamboat inspection service on the Tinius, Olsen & Co. testing machine. Following are the results of the tests of six samples:

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
Thickness of samples in hundredths of an inch	.39	.309	.376	.537	.561	.622
Widths of samples in hundredths of an inch	.633	.82	.678	.486	.454	.425
Strain at which each sample parted	17,400	18,000	16,700	19,500	16,700	18,200
Strain per square inch of section	74,824	71,039	65,430	74,710	63,568	66,330
Reduced width of sample	.51	.66	.52	.35	.28	.29
Reduced thickness of sample	.23	.188	.194	.367	.342	.425
Reduction of area, per cent	52.49	48.81	60.43	50.79	66.73	55.08

Since the policy was adopted of using none but domestic steel in all the new ships in the navy, there has been a great advance in the art of making and working steel in this country. When that policy was first adopted, on an average less than 70 per cent. of the output of the various mills was able to pass the naval inspection. With increased experience has come the ability to do much better work, and Commodore Sicard, president of the naval board of steel inspection, says that more than 90 per cent. of the steel will now pass the most rigid inspection.—[Marine Review.

Steel Plate Trial.

The plate made by Schneider & Co., of Le Creuzot, France, for the Chilian armor clad has been officially tested at Garve. The plate chosen measured 18 32 feet long by 6 75 feet wide. It was a belt plate of trapezoidal section, and presented a thickness of 8.07 inches at the upper edge and of 5.31 inches at the lower. The gun was of 6 4-inch caliber and the projectiles were of chilled cast iron. Three projectiles were fired, with a striking velocity of 1,463, 1,459 and 1,564 foot seconds respectively. The energy of these projectiles was 1.13 times that necessary to go completely through an iron plate of the same thickness at the points of impact. All of the projectiles were of good quality. After the fire the plate presented but three slight cracks, all starting from the point of impact of the first shot. Neither the backing nor the bolts suffered.

A WATCHMAKER in Newcastle, Eng., recently completed a set of three gold shirt studs, in one of which is a watch that keeps excellent time, the dial being only three-sixteenths of an inch in diameter. The three studs are connected by a strip of silver inside the shirt bosom, and the watch contained in the middle one is wound up by turning the stud above. The hands are set by turning the one below.

MANUFACTURING PROFITS IN GREAT BRITAIN.

Those who are opposed to the protective tariff system are fond of holding up our manufacturers to public view as monsters of greed, as self-aggrandizing appropriators of enormous profits wrung from victimized consumers rendered helpless by act of Congress, and as proper objects upon whom to expend scorn and execration. When, in times of prosperity, some of our manufacturers are able to declare a dividend of 10 to 12 per cent. they are singled out for abuse and denounced without stint as "robber barons," "tariff pets," "a privileged class," until it might be supposed that, instead of being bulwarks of strength to the nation, they are rapacious enemies of society. But we never hear from these noisy and persistent objectors any complaint about the marvelous gains which are not uncommon among British manufacturers. For example, London *Engineering*, last month (August 8) contained the following notice: "The high rates of iron have shown themselves in a remarkable way, in connection with the Consett Iron Co., Limited, which, with a paid-up capital of £700,000, made a net profit of £366,000 for the year ending June; 33⅓ per cent. is paid in dividends, leaving a balance of £134,000, which is applied for enlarging works and buying collieries. In 1889, 20 per cent. was paid." In regard to another corporation the *American Manufacturer's* English letter made this statement: "The report of the directors of Henry Bessemer & Co, Sheffield, shows a net profit for the year of £37,138. The directors recommend the payment of a dividend of 20s. per share, which, with the 20s. per share paid in July last, makes a dividend of 25 per cent. for the year. They also recommend writing off £5,000 from the improvements and additions account. This will leave a balance of £23,216 to be carried forward to next year. This report is considered very satisfactory. Brown & Bayley's steel works have just declared a dividend at the rate of 17½ per cent., making with the interim amount of 7½ per cent. already paid, a splendid total dividend of 25 per cent. for the year." About the same date the London *Iron and Steel Trades Review* made these announcements: "Bell's Asbestos Co., Limited, have declared an interim dividend of 10s. per share (free of income tax) for the half year ended 30th June last, being at the rate of 20 per cent. per annum. The annual report of Sandwell Park Colliery Co., West Bromwich, shows that during the past year a profit of nearly £31,000 has been earned, making, with the balance brought forward, about £34,000 available for dividend. The directors recommend the payment of 10 per cent. per annum dividend, with a bonus of 10s. per share, equal to a total dividend of 20 per cent., besides carrying £6,000 forward. During the past two years the company's £10 shares have advanced from £9 to £19, or 110 per cent."

Here is plenty of unadulterated food for reflection on the part of the tariff howlers, whose sensitive souls are harrowed to the very core whenever 10 to 12 per cent. dividends are declared by manufacturers in the United States. If those rates of profit are evidences of hands of greed thrust by the act of Congress into the pockets of the people, how much greater must be the plundered helplessness of the British consumers, under the blessed policy of so-called free trade! To make the contrast still worse, those lords of the rolling mill and earls of the trip hammer, while reveling in such enormous gains, pay their toiling slaves of British free trade such a pittance of compensation as to be a mere apology for freedom wages in contrast with the comfort wages received by American workmen in the same lines of production, illustrated, for instance, by $1.70 per ton paid to the puddler in England against the $5.50 paid to the puddler in Pennsylvania. Companioned with the high profits of British mill owners are degradation and privation and wretchedness among the toilers, while the consorts of American dividends are for the workers largeness of life, including plenty to eat and to wear, and a surplus from earnings to deposit in the savings bank. These radical differences in the purchasing power and other conditions of the great mass of consumers in England and in the United States are prime factors of the tariff problem which the professional and chronic remonstrants against the protective system never take into their calculations, simply because the set purpose of these agitators is not, as they claim, the ascertainment and the vindication of the truth, but victory by hook or by crook for their own dear selves, without any consideration whatever for the evil consequences to other people. Their science of political economy is a science based upon assumptions, usually false assumptions, which reinforce their designs far more satisfactory than could any range of solid facts drawn from either individual or national experience. To reason with such anti-protectionists, hoping to enlighten their minds and change their views, is to cast pearls before swine. All that can be done is to counteract their efforts by public exposure of their hypocritical pretenses, their unfounded assertions, their adroit plausibilities and their brazen lies, while watching diligently to frustrate emissaries who cross the Atlantic to our shores with bribes in their hands to tempt unscrupulous men to betray their trusts.—[Industrial World.

Notable Application of Water Power.

Some interesting features are noted in the power equipment of the Treadwell mill, Alaska—the largest quartz mill in the world, consisting of 240 stamps, 96 concentrators, 12 ore crushers, etc., and requiring about 500 horsepower. All of this machinery, covering several acres of ground, is run by a single wheel 7 feet in diameter, operating under a head of 490 feet, making 235 revolutions, and using 630 cubic feet of water per minute, this being discharged through a nozzle 3·31 inches in diameter; with a 4-inch nozzle this wheel will work up to 735 horse-power. Regulation is afforded by the use of a deflecting nozzle operated by a hydraulic governor; the nozzle is about four feet long with a ball joint at the butt end, and to the discharge end is attached by lever connections an automatic hydraulic regulator, which varies the amount of water applied to the wheel as may be needed to adapt it to varying loads—a device which affords a peculiarly simple, sensitive and satisfactory regulation. With such an arrangement, and in such a location, the advantage of water power is conspicuous. Thus the wheel above mentioned weighs but 800 pounds, and the entire equipment, embracing shafts, boxes, driving pulley, etc., only about 4,000 pounds; on the other hand, a steam machinery plant, to give the maximum capacity of such a wheel, would not weigh less than 200 tons, and the expense of running such a plant would be almost immeasurably greater.—[Mining and Scientific Press.

THE SMOKE NUISANCE.

There is probably no one subject that has attracted more attention in the mechanical world than the smoke nuisance, and there is no subject of more interest to the cities where bituminous coal is used for fuel. Nearly all of the cities of the world have ordinances for the purpose of compelling people who burn soft coal to abate the nuisance. London has ordinance upon its books, dating back to more than fifty years, and other cities have agitated the question almost constantly ever since; yet we have no record where any of the cities have succeeded in ridding themselves of the intolerable nuisance. It has become a very grave question in the city of Chicago, and a question well worth the attention of the present administration. There is no one thing that the chief magistrate of a city could accomplish that would give him so much glory as to be the first in the world to bring about the abatement of the smoke nuisance. We are frank to say that the present admininstration has done more to bring about that desired end than all that has been done heretofore, yet the work has hardly begun. The ordinance relating to smoke nuisance would seem to contain all that is necessary. It has stood the test of the courts for the last nine years, and has been fully sustained. There is but little or no opposition from those who violate the ordinance, and the majority of them have made repeated efforts to comply, but have failed simply for the reason that the device they used, or attempted to use, is not practical from a mechanical standpoint. It is a well-known fact that the mechanical construction of a furnace that has been successful under certain conditions as to location, the amount of duty performed and quality of coal used, has failed utterly when any of the above conditions were changed; and a device has been known to work successfully, practically and profitably upon one particular furnace, and proved utterly worthless (and some instances worse than useless) upon any other furnace. Engineers, as a rule, have not devoted as much time to the construction and operation of their furnaces as they have to their machinery, and, consequently, are not always competent to judge whether a particular construction of furnace—one that may have worked successfully in one particular locality under particular conditions—could be worked successfully when those conditions have been changed. Much of what has been written on the subject has tended to mislead mechanics, manufacturers and soft coal users generally into making impracticable and useless experiments. The statement that smoke cannot be burned, for instance, would seem to be a foregone conclusion among many who claim to be intelligent upon the subject. This is a mistake. The smoke escaping from a chimney is the result of incomplete combustion, caused by a lack of oxygen and hydrogen, during the time when these gases are being generated. The gas made for llluminating purposes is composed of carbon, oxygen and hydrogen combined in certain well known proportions. Natural gas requires a mixture of oxygen and hydrogen before it can be used for illuminating or heating purposes. It has been demonstrated within the last few months that the only practical solution of the smoke nuisance, is to convert fuel into gas, which is now done very successfully and practically; and it is a surprise to many people who claim to be intelligent upon the subject to see how easily the ordinary steam boiler furnace can be converted into a water-gas furnace, as is being done on the locomotives of the Northwestern Railway, and at Phexix Building, Dearborn Station, 31st street Laundry, National Life Building and many others.—[Industrial World, Chicago.

Death of an Ohio Iron Manager.

We are advised by the Ohio Iron Co., of Zanesville, of the death of their Secretary, Captain Charles William Greene, at his residence in Zanesville, August 29th, 1890. Captain Greene was born a few miles above Ironton, in Lawrence county, O., March 20th, 1841, and spent his boyhood and early manhood in Southern Ohio. In July, 1861, he enlisted as a private in Co. E, 27th regiment, Ohio Volunteer Infantry; was elected second lieutenant when the company was mustered, promoted to first lieutenant March 27, 1862, and to capitan November 2nd, 1862. He served with his regiment with credit in Missouri, Tennessee, Mississippi, Alabama and Georgia; was twice wounded, being struck with a fragment of a shell in the battle of Corinth, Miss., October 4th, 1862, and shot through the foot at Dallas, Ga., May 30th, 1864. The latter wound disabled him for further service, lamed him for life, and he was honorably discharged September 1st, 1864. He was manager of Keystone furnace, in Jackson county, O., from 1866 to 1872 and came to Zanesville the latter year and was afterward connected with the management of the Ohio Iron Co. to the time of his death, though unable to participate actively for the past two years because of failing health.

Knappschaftsberufsgenossenschaft.

This is the euphonious title of a German miners' society of mutual accident insurance. It pays damages according to fixed rules, and endeavors to diminish accidents by proposals addressed to the Government, as well as to mine managers, concerning improvements in safety appliances. In 1889, 375,410 persons were members. Their yearly income is estimated at 310,114,152 mks., or, on an average, 826 mks. The indemnities paid during the year for the 27,038 accidents (or 7 2 per cent. of the number of people insured), of which 816, or 0 22 per cent., were fatal, amounted to 2 378,700 mks. Expenses, inclusive of medical and other examinations, fixing of indemnity, cost legal advice and appeals, and of measures taken to prevent accidents, amounted to 295,277 mks. The capital account showed a balance at the end of the year of 9,296,997 mks.—[Engineering and Mining Journal.

THE AXE AND TOOL COMBINATION.

The American Axe & Tool Co. have recently been making an effort to control the scythe market, but this attempt has been unsuccessful and the project has been abandoned. There was some question on their part as to the advisability of extending their field, and some unexpected obstacles were found to stand in the way of the scheme. This, together with a growing appreciation of the magnitude of their enterprise in keeping control of the axe market, led to the abandonment of the project in regard to scythes. This line of goods accordingly remains in open market. In this connection, the fact that the American Axe & Tool Co. have failed to purchase the plant of the Dunn Edge Tool Co, Oakland, Me, in accordance with an understanding which had been reached, is regarded as having peculiar significance. According to advices which we have received, soon after the organization of the American Axe & Tool Co, negotiations were entered into with the Dunn Edge Tool Co. for the purchase of their factory, in which both axes and scythes are manufactured, and the owners considered it a settled thing that the entire property would be taken by the company upon the terms agreed to, it being understood that the consummation of the sale and the transfer of papers was to be made August 1, and that after that date the Dunn Edge Tool Co. as manufacturers was no longer to exist. In the meantime the axe consolidation, finding that it would not be feasible to control the manufacture of scythes, are represented as seeking some pretext by which they could avoid the carrying out of their contract in regard to the purchase of the Dunn plant. This pretext, according to uncontradicted reports from Oakland, was found in the inability of the company to show a clear title to a very small plot of ground included in the bargain, but in no way connected with the plant. It is also stated that the loss to the Dunn Edge Tool Co. by the interruption to their business by the negotiations thus unfortunately terminated has been serious, and will be made the ground for litigation.

The matter is, however, of more general importance from its bearing upon the question as to the ability of the American Axe & Tool Co. to control the market. It is generally conceded that their attempt to control scythes was unwise, and that even if in it they had been at the outset successful they would soon have encountered serious difficulties; while, failing in the attempt, there has been for them a certain loss of prestige, especially in view of their non-purchase of the Dunn plant in accordance with their understanding with its owners and their own announcements made in regard to it. At the same time, the fact that the Dunn Edge Tool Co. will be in the market as manufacturers of axes will be a thorn in the side of the consolidated interests. This competition, together with the constantly developing manufacture of outside goods, can scarcely fail to be more or less seriously felt by the American Axe & Tool Co. These facts, together with rumors in regard to difficulties which they have encountered and the limited demand for goods under which some of the manufacturers are disposed to be impatient, with other indications of a weakening in the company's control of the axe market, suggest in the minds of shrewd hardwaremen the question as to the future course of things in the company's affairs. It is, however, to be born in mind that the American Axe & Tool Co. is a very strong concern, and at present in almost absolute control of the axe market, and that, with its great facilities and the advantages possessed by it, it is likely to retain its control for some time to come. It is, however, a question whether its present prices will be very long maintained, as there is a growing probability they may consider it advisable to reduce them in view of dissatisfaction among the trade, and the offering of outside goods at lower prices—[Iron Age.

SMALL MANUFACTURERS AND COMBINATIONS.

Attempts to form great combinations of manufacturers of machinery in this country, after the style of combinations in other industries, are likely to be failures for generations to come at least, principally for the reasons that the effort is always toward improvement in design and construction, that the ability to make these improvements is so widespread, and that anything like a universal standard by which to measure excellence of design and construction of machines, cannot be established. In some industries capital is able, through immense combination, to hold the field against successful competition, because of its ability to use vast sums of money in plants and accessories for doing the work of manufacturing, and in transacting the business, and, if need be, in crushing those of moderate means, who presume to interfere. In such instances, however, the quality of the product must, generally speaking, be easily come at—bounded by definite lines, as it were. For example, a pound of sugar or gallon of oil of a certain easily determined quality, is as good in every way as another pound of sugar or gallon of oil of the same quality. Standards can be set up for measuring the quality of either of these products. But it is not possible to set up such standards for measuring the products of the machine shop. There are no simple tests to which such products can be put, and which will satisfy the purchaser.

Assume that there is, in the instance of the steam engine, for example, a combination of all the best manufacturers in the country, and that the manufacture of these engines is, by the employment of unlimited capital, brought to the lowest point in cost. Let this be accomplished, and the next month, or the next year, a dozen—more or less—better engines, or, what will answer the same purpose, engines thought to be better than those controlled by the combination, will be made; and they will sell, because they are better, or thought to be; sell for the same reason that one-dollar and two-dollar pocket knives will sell, notwithstanding knives can be bought for twenty-five cents.

So long as the room for improvement exists to the extent that it does in nearly all products of the machine shop, there is little prospects of trusts of extensive combinations in the business. Men of moderate capital will find opportunities to build good machinery, and to put their product before the buyer; opportunities to grow up from a modest beginning, as most great machinery manufacturers have grown up. The demand for something bette is a demand that is never satisfied, and when this demand is met by the individual, he has a chance even against the most powerful combinations.

It is undoubtedly true that it is not so easy to start in a small way in the machine business, as it once was. Modern appliances for doing work at small expense are costly, and the small manufacturer must make shift to get along without many of them. But realizing the disadvantages under which he labors, he makes up for this, in part at least, by increased energy, and the greater attention his limited field of action enables him to give details, and, if his stock of patience and perseverance does not fail, he has good prospects of marching along with the times. Examples of this are numerous enough to give strength to the courageous. The day of the small manufacturer in the machinery line is by no means past. Failures to succeed may be more numerous, and it is undoubtedly more and more every day a question of the survival of the fittest, but this is so in everything.—[American Machinist.

IRON AND WOOD.

An interesting economic change now going on is the use of iron for many purposes in which lumber has been heretofore employed. The *Timberman*, a western journal devoted to the interest of the lumber trade, quotes a Cincinnati lumber merchant who says that the trade in white pine has fallen off one-third in six years. Of course a great share of this is attributed to the decrease in the lumber supply; but it is accompanied by the introduction of iron in many capacities. This merchant cites the use of iron window frames, wire netting for laths, and tiles instead of wood for flooring. The illustration could be indefinitely enlarged. The experiment of steel ties to be used in place of wood, is underway. The use of iron girders, in place of wooden joists, has become universal in the higher-priced buildings, and the employment of frames made entirely in that way in place of the old frame buildings has resolved itself merely into a question of cost. Mechanical Hall, at the Pittsburg Exposition, is a favorable example of a building constructed with a complete substitution of iron for wood as a building material.

This use of iron in the place of wood for many of the most important purposes in industry is, of course, especially important to Pittsburgh as the iron and steel centre of the country. Its progress and the expectation of its further development is illustrated by the possibility that iron or steel ties can be substituted for wood. If in that use, where what was originally the cheapest timber was employed, iron or steel can be economically substituted, it certainly seems as if the same change can be more successfully made in the departments of industry where more costly timber is used. The vital factor is, of course, the respective cost of the two classes of material in proportion to their durability, and one of the most efficient causes in making the change possible, is the cheapness of iron that has prevailed for the past ten years, and the steadily enhancing cost of lumber.

The results of these factors furnish a valuable illustration of the economic principle that the reduction of the cost of any staple furnishes its own recompense not only by extending its markets, but by developing new uses which were impossible at the higher range of cost. Only the other day the *Dispatch* called attention to the effect of the low prices that have prevailed for iron since 1880, in more than doubling the consumption of iron while the population has increased but little over a quarter. The displacement of wood by iron is not only an illustration of the new uses that are developed by low prices, but furnishes an evidence that if iron can be kept relatively as cheap as lumber, the use of it in that way will open up a vast field for the expansion of the iron trade which is, so far, almost unexplored.

The diminution in the use of lumber is the converse of the same proposition. The advancing cost of that material has steadily limited its use until in some of the old forms that were the most common it has become absolutely a luxury. Iron is taking its place for some purposes, tiles for others and brick for others. It is clear that if the supply of lumber continues to diminish, other materials must displace it until finally the change will be so great as to restore the balance and the demand will be as limited as the supply. It is not likely that the displacement of lumber will be so complete that the man who now plants waste ground with a forest will not leave a fortune to his descendants; but if the present tendency continues the relief from the timber famine must come into the substitution of other materials.

It is to be hoped that the enlarged use of iron in this way may be utilized for an indefinite expansion of Pittsburgh's industry; and the evidence of the benefit of low cost for any great staple, will convince our manufacturers of the falsity of all theories that look toward an artificial enhancement of prices. —[Pittsburgh Dispatch.

Pittsburgh Excursion.

On account of the Catholic Congress, the Cleveland & Pittsburgh Railroad will sell excursion tickets to Pittsburgh and return at the low rate of $3.00 for the round trip, Sunday, September 21st; tickets good returning until September 27th. Special train leaves Union Depot at 11 P. M., on which the Catholic Societies will go. Telephone No. 27, C. L. Kimball, A. G. P. A., for full information.

ONE of the mechanics of the Pennsylvania lines is working on a device by which coal will be fed to the firebox of a locomotive in the same manner that a base-burner is fed. It is claimed that if the device is perfected it will greatly increase the heat in the firebox, as no cold air will rush in, as is the case when the door to the firebox is opened to throw in coal.

THE *Engineering and Mining Journal* denounces Prof. Hirsch's statement that he can make aluminum at fifteen cents a pound as "the Chicago humbug." That publication has a habit of calling things by their names, and this always after intelligent examination.—[National Labor Tribune.

INDUSTRIAL SUMMARY.

New Enterprises :—

The Georgia Rolling Stock Co. has been incorporated at Macon, Ga., by H. J. Lamar, J. S. Schofield, J. S. Baxter and others to build car works. The capital stock is $250,000.

M. M. Rogers, L. L. Powell, W. S. Gooch and others will, it is reported, organize a stock company to erect a plant at Roanoke, Va., for the manufacture of the Woolly patent electric motor.

The Vulcan Boiler Works, Toledo, O , have been incorporated with a capital stock of $35,000. The new company will manufacture boilers on a large scale under patents owned by J. J. Cronin.

The Dominion Railway Supply Co. has been incorporated with a capital stock of $100,000, and will erect works at Windsor, Ont., for the manufacture of railway appliances, machinery, tools and supplies.

At Birmingham, Ala., Reed Williams, Carl Jensen and others, have bought the Birmingham Bolt & Nut Works, and will transform it into a factory for the manufacture of plow and agricultural implements.

A company has been organized by J. M. Hunt and others to establish a factory at Macon, Ga., for the manufacture of a mower, recently patented by Mr. Hunt. The company have a capital stock of $50,000.

The Le Van Boiler Co. have filed articles of incorporation. The company will construct and sell steam boilers, furnaces and other machinery in Paterson and Camden, N. J., and Philadelphia, Pa., the factory to be located in the latter city.

At Fayetteville, N. C., the Carolina Machinery Co. have been organized with A. B. Williams, President; M. H. Russell, General Manager, and W. S. Cook, Treasurer. The company have a capital stock of $20,000, some of which was subscribed in Boston.

The Humbert Nut-Lock Co. has been incorporated at Basic City, Va., with T. S. Doyle, of Staunton, Va., as President; J. F. Christian, of Roanoke, Va., Vice-President, and Taylor Bissell, of Staunton, Secretary, to manufacture nut-locks. The capital stock is $10,000.

The Pennsylvania Metallic Cornice Manufacturing Co., of Wilkesbarre, Pa., has been chartered with a capital of $30,000. The directors are, Morris J. Keck, Elmer Z. Smith, John J. C. Weller, Wm. M. Barnes, James F. Mack, John Fourch, James Dewey, of Wilkesbarre.

R. A. Bret, of Chicago, has been in consultation with the leading business men and manufacturers of Evansville, Ind., with the object of establishing a steel car plant at that place. It is said that his plans have been favorably received, and that there is little doubt about his success.

The Rome (Ga.) Rolling Mill has been purchased for $38,500, by B. A Jenkins, of Knoxville, Tenn.; J. J. Reed, D. R. Benynon and others, who have incorporated the Rome Cotton Tie Manufacturing Co. to operate the same. The capital is $50,000, and the plant will be enlarged.

Henry Cummins, W. T. Black and G. W. N. Yost have incorporated at Covington, Ky., the Davidson Writing Machine Co. to manufacture typewriters. The capital stock authorized is $500,000. They are also reported as incorporating the Consolidated Writing Machine Co., with a capital of $3,000,000, for the same purpose.

The Ohio Manufacturing & Investment Co. has been organized at Florence, Ala., with a capital of $1,000,000. The officers elected are: A. W. Stockwell, President; E. R. Carlisle, Vice-President; J. R. Sheridan, Secretary and Treasurer. The object of the company is the general development of the industrial enterprises of Florence.

Judge Welford, of the City Circuit Court of Richmond, Va., has chartered the Waddell Railway Signal Co., with a paid-up capital of $100,000, and the privilege of increasing the same to $2,000,000. The objects of the company are to manufacture and sell certain signals patented in the United States and Europe, to railway companies. The officers are: President, S. H. Letcher; Vice-President, O. O. Owen; Secretary and Treasurer, B. C. Wherry; Directors: W. H. Waddell, T. S. Doyle, D. C. Jackson, I. C. Boude, Granville Gaines, O. O. Owens, W. J. Johnson, John B. Carey and H. W. Flournoy.

Enlargements, Additions, Removals, Etc.:—

The St. Louis, Arkansas & Texas Railway (office, St. Louis, Mo.,) will erect machine shops and roundhouses in Commerce, Tex.

The file works of Hubbard & Haskill have been removed from Erie Pa., to Painesville, O. on account of the liberal inducements offered by citizens of the latter place.

A large plant for the manufacture of steel for edge tools is shortly to be removed from Canada to Atlanta, Ga. The process employed will be an entirely new one.

The Superior Horse Nail Co., of Chicago, Ill., have concluded to move their factory to Kankakee, Ill., and to materially increase their capacity by the addition of new machinery.

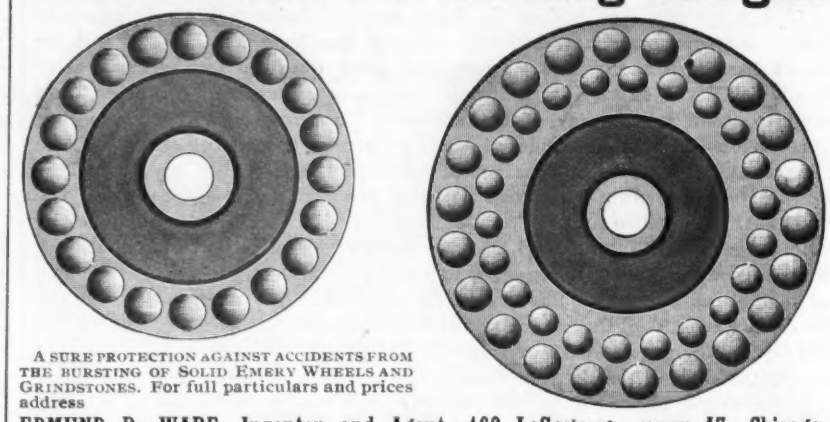
The Graham Land & Improvement Co. has, it is stated, closed contract with the C. P. McWane Plow & Foundry Co., of Wytheville, Va., for the removal of its iron foundry and plow works to Graham, Va.

The Gates Iron Works, Chicago, Ill., have built a new shop 68x150 feet, which will contain three traveling cranes running the full length of the building. The center crane is 22 feet high, and those on the sides are each 19 feet. The center trolley is intended to handle the heaviest machines built by the company, weighing from 40,000 to 80,000 pounds each.

The Chicago Axe Co. has leased the Safe and Lock plant at Hammond, Ind., for five years, with an option for the purchase of the plant at a stated price at any time within that period. The company promises to employ 150 men at once, and to increase the number to 300 within a year. It expects to begin selling the product of the new factory by Oct. 1.

The Allegheny Bessemer Steel Co., of Pittsburgh, with works at Duquesne, Pa., made the largest run in the history of the firm last month. During that period there was turned out 16,814 tons of rails, 20,000 tons of raw steel in the converting mill, and 17,000 tons of blooms. The improvements in the converting mill and the new blooming mill, now under way, will be completed in a short time. These improvements and additions will increase the capacity of the plant to 20,000 tons of rails per month.

Ware's Patent Anti-Bursting Flanges.



A SURE PROTECTION AGAINST ACCIDENTS FROM THE BURSTING OF SOLID EMERY WHEELS AND GRINDSTONES. For full particulars and prices address

EDMUND R. WARE, Inventor and Agent, 162 LaSalle-st., Room 47, Chicago.

General Industrial Notes:—

The Premier Steel Co., composed of capitalists of New Albany, Ind., have purchased the entire plant of the Indianapolis Rolling Mill for $132,000.

The machinists in the employ of the Lloyd-Booth Co. and William Tod & Co., both of Youngstown O., have had their working hours reduced from ten to nine, without any reduction in wages.

E. T. Barnum, 179 Jefferson avenue, Detroit, Mich., write us that he has recently secured the contract for all the wire and iron work for the annex to the post office in that city. This is quite an important and extensive job, and Mr. Barnum, being the lowest bidder, secured the contract.

The Cleveland Twist Drill Co. write us that their orders during the Summer have far exceeded their expectations and capacity. They have just increased their turning department seventy-five per cent., have made large additions to their factory and hope to be able now to fill all orders promptly.

E. W. Cricton, furnace superintendent of the Oregon Iron & Steel Co., at Oswego, Ore., reports that the furnace turned out during the month of August in 28 days running time 1,338 tons of pig iron, an average of 48⅓ tons per day. The best week's product was 355 tons; the best daily turn out 68 tons.

Frank Felton, foreman of the puddling department of the sheet mill at New Castle, has completed a device for causing a draft in puddling furnaces by injecting a jet of steam through an iron tuyere leading to the fire bed, making a strong current of air. The device is being given a trial that promises success.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 P. M., on the 26th day of September, 1890, for furnishing and putting in place complete one hydraulic passenger elevator, one direct acting freight elevator and one direct acting ash lift for the U. S. Court House, Post Office, etc., at Rochester, N. Y.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock, P. M., on the 8th day of October, 1890, for all labor and material required to furnish and put in place complete the low-pressure steam heating and ventilating apparatus, etc., for the U. S. Court House and Post Office building at Pittsburgh, Pa.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock, P. M., on the 24th day of September, 1890, for all labor and material and fixing in place complete the low-temperature hot water heating and ventilating apparatus for the extension to the U. S. Post Office, Court House, etc., building at Charleston, W. Va.

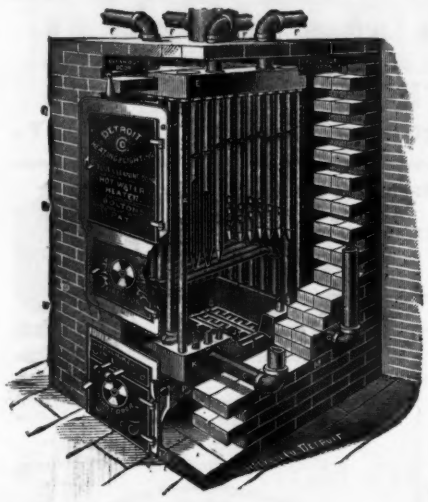
The Wickes Bros. Boiler Works, East Saginaw, Mich., report business as booming. They are running a large force of men night and day and have a large number of orders on their books. They are especially busy on boiler work for large vessels, they having built two 13′ boilers for steel vessels now being built in Wheeler's ship yard, at Bay City, and have orders for two more, same size. The vessels are intended for ocean trade. Their boilers and engines will be found all over the country, as they have a trade extending from Maine to California.

A Rare Opportunity

To visit Pittsburgh is via the Cleveland & Pittsburgh Railroad, Sunday, September 21st, when the rate will be but $3 00 for the round trip; tickets good returning until September 27th. Special train leaves Union Depot at 11 P. M. Call at offices of the C. & P. R. R., Weddell House corner; Union Depot, Euclid Avenue, Woodland Avenue or Newburgh for full particulars.

THE snow-sheds on the Southern Pacific railroad in the Sierra Nevada mountains represent to-day 200,000,000 feet of lumber and an expense of fully $3,000,000. It cost about $2,000,000 to build them in the first place and some $1,000,000 to keep them in repair during the past twenty years. The money they have cost would build homes for a town of 6,000 people, each home costing $3,000, and six people to a house.

BOLTON



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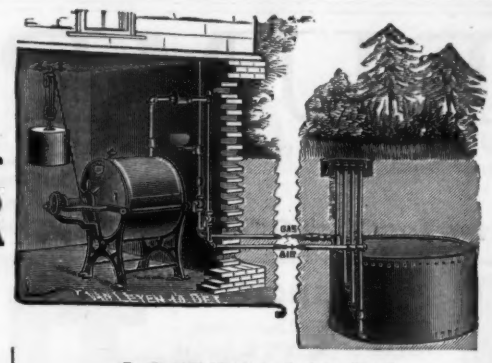

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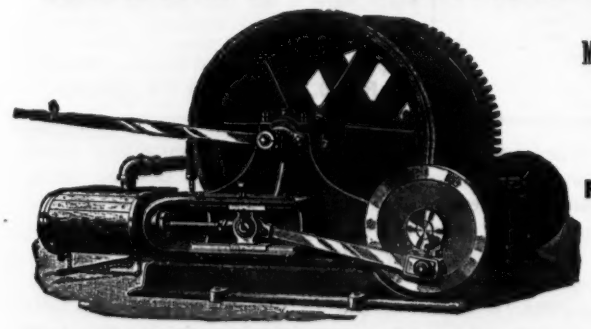

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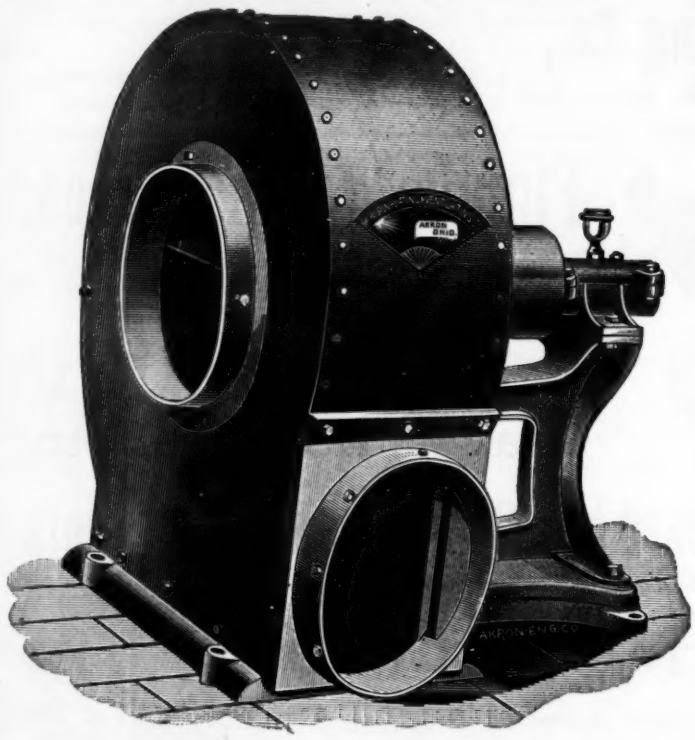

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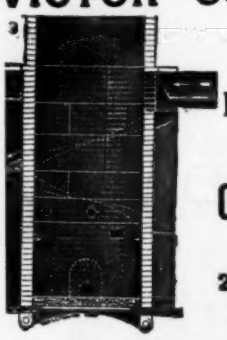

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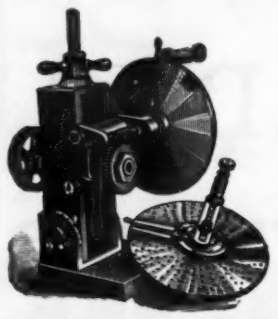

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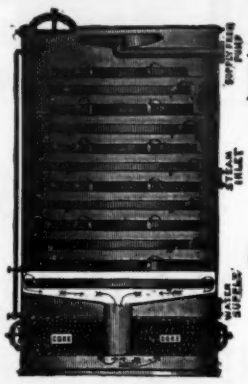

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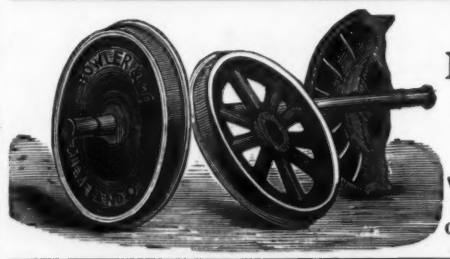

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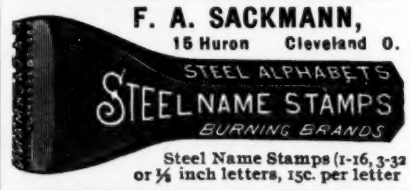

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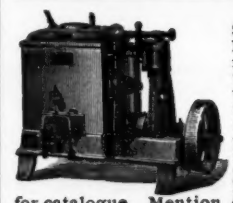

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2¾ to 3¼ inch	2 45
3½ to 4 inch	2 95
4¼ to 4½ inch	3 45
4¾ to 5 inch	3 65

Oval.

⅜ to 1¼ inch	2 35
½ to ¾ inch	2 55
⅞	2 75
1	3 15

Half Oval and Half Round.

1⅛ to 3 inch	3 05
⅜ to 1¼ inch	2 65
½ to ¾ inch	2 35
⅞	3 45
1	4 95

Heavy Band.

1⅛ to 6 by ¼ and 5-16 inch	2 15
1 to 1¾ by ¼ and 5-16 inch	2 25
¼ to ⅜ by ¼ and 5-16 inch	2 45
⅛ to ⅜ by ¼ and 5-16 inch	2 95

Hoops.

1¼ to 4, Nos. 13 to 15	2 75
1¼ to 2, Nos. 16 to 18	2 85
1¼ to 2, No. 19	2 95
1¼ to 2, No. 20	3 05
1¼ to 2, No. 21	3 15
1¼ to 2, No. 22	3 25
15-16, 1 and 1¼, Nos. 13 to 15	2 95
15-16, 1 and 1¼, Nos. 16 to 18	3 05
15-16, 1 and 1¼, Nos. 19 and 20	3 15
15-16, 1 and 1¼, No. 21	3 25
15-16, 1 and 1⅛, No. 22	3 35
⅞, Nos. 13 to 15	3 15
⅞, Nos. 16 to 18	3 25
⅞, Nos. 19 and 20	3 35
⅞, No. 21	3 45
⅞, No. 22	3 55
13-16, Nos. 13 to 15	3 35
13-16, Nos. 16 to 18	3 45
13-16, Nos. 19 and 20	3 55
13-16, No. 21	3 65
13-16, No. 22	3 75
¾, Nos. 13 to 15	3 45
¾, Nos. 16 to 18	3 65
¾, Nos. 19 and 20	3 75
¾, No. 21	3 85
¾, No. 22	3 95
11-16, Nos. 13 to 15	3 65
11-16, Nos. 16 to 18	3 85
11-16, Nos. 19 and 20	3 95
11-16, No. 21	4 05
11-16, No. 22	4 15
⅝, Nos. 13 to 15	3 95
⅝, Nos. 16 to 18	4 15
⅝, Nos. 19 and 20	4 25
⅝, No. 21	4 35
⅝, No. 22	4 45
⅝, No. 23	4 65

Light Band.

1¼ to 6 by ⅛ to 3-16 in	2 35
1¼ to 6 by Nos. 11 and 12	2 45
1 to 1¾ by ¼ to 3-16 in	2 55
1 to 1¾ by Nos. 11 and 12	2 65
⅞ and 13-16 by ¼ to 3-16 in	2 85
⅞ and 1 3-16 by Nos. 11 and 12	2 95
¾ and 11-16 by ⅛ to 3-16 in	3 15
¾ and 11-16 by Nos. 11 and 12	3 25
⅝ and 9-16 by ⅛ to 3-16 in	3 45
⅝ and 9-16 by Nos. 11 and 12	3 55
½ by ⅛ to 3-16 in	3 75
½ by Nos. 11 and 12	3 85

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	2 95
⅞ inch, " " " 13 and 14	3 15
¾ inch, " " " 11 and 12	3 25
¾ inch, " " " 13 and 14	3 45

Sheet Iron.

No. 10 to 14	2 65
No. 15 to 17	2 80
No. 18 to 21	3 00
No. 22 to 24	3 20
No. 25 to 26	3 35
No. 27	3 45
No. 28	3 55

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 80
C No. 1, " "	3 05
C H No. 1 " "	3 30
C H Flange, " "	4 05
Extra Flange, "	4 55
Solid Fire Box "	5 30

Steel Boiler Plates—1-4 in. and Heavier.

Tank	3 00
Shell	3 40
Flange	3 70
Marine Flange	4 10
Fire Box	4 80

Above includes plates 90 inches wide.

90 to 96 in. wide	⅛c lb extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1⅛c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	09
9-16 to ⅞ in "	09
7-16 to ⅜ and 2¾ to 3 in	10½
3¼ to 4 in	11
⅞ to 11-16 and 4¼	10½
⅞ to 6 in	11½
¼ to 9-32 and 6¼ to 7 in	12
3-6 in	14

Flats.

	cts. lbs
2 to 9-16 wide by 2 to ⅛ thick	9

Bessemer and O. H. Steel.

Machinery	base price, 3 00
Tire	" 3 00
Spring	" 3 50
Sleigh Shoe	" 3 00
Toe Calk	" 3 25
Cutter Shoes, tapered and burr.	" 3 25

English Tool Steel.

Jessop's	16c
Hobson's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

⅛, ⅜, 11-16 and ¾ inches diameter	4 00
Bridge ⅛, ⅜, 11-16 and ¾ inch diam	4 00

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	NET TONS
No. 1 R. R. wrought scrap	$19 50
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Iron axles	22 00
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Cast borings	9 00
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Steel boiler plates	17 00
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Pipes and flues (Clean)	13 00
Tank iron	13 00
Hoop and band iron	9 00
Sheet iron	10 00
Wrought drillings	11 00
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Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
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Casting Borings	9 00
Wrought Turnings	12 00

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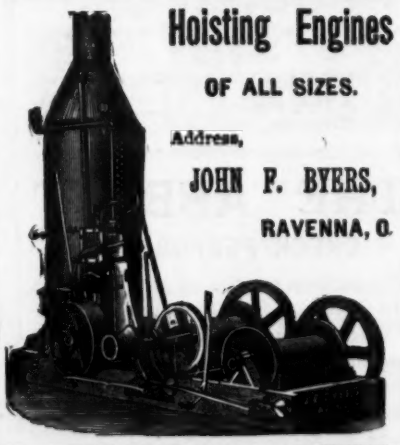

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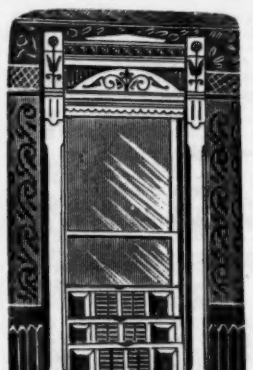

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Boston Belting Co's standard ..... dis 70
" " " extra ..... dis 60&5
" " " best ..... dis 55
Hoyt's Short Lap ..... dis 45
Cleveland Rubber Co. extra standard .dis 60&10
Shults Raw Hide Leather Belting, single, ... dis 40
Shults Raw Hide Leather Belting, double, and Light Double ..... dis 40
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Alexander Brothers' pure oak tanned. ...dis 45

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Boston Blower Co. ..... dis 35
Buffalo ..... dis 35

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White ..... ₩ gross 50
White Crayon ..... ₩ gross 12@12½ dis 10
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Cushman's 4 Jaw Independent ..... dis 45
" Combination ..... dis 40
" Geared Scroll ..... dis 30
" 2 Jaw Brass Workers ..... dis 30
" Drill ..... dis 35
Wescott's Scroll Combination ..... dis 33⅓
" Independent ..... dis 40
" Little Giant Drill ..... dis 30
Horton's Universal ..... dis 40
" Independent ..... dis 45
Whiton's Independent ..... dis 45
National Combination ..... dis 40
Sweetland " ..... dis 40
Almond Drill ..... dis 20
Morse " ..... dis 15
Skinner's Combination Lathe ..... dis 33⅓
" Independent Lathe ..... dis 40
" Universal Lathe ..... dis 40
" Drill ..... dis 15

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Pratt & Whitney ..... dis 10@15
Standard ..... dis 10@15
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" " Gear Cutters ..... dis 15

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Twist drills ..... dis 50&10
Morse Taper and Straight shank to 1¼" ..... dis 50&10
Morse Taper and Straight shank Larger than 1¼" ..... dis 25
Drill Sockets ..... dis 25
Standard Twist Drills ..... dis 55@55&5
Cleveland " " ..... dis 55@55&5

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	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4½c	5½c		2¾c
¼ kegs ₩ lb	4¾c	5¾c		3 c
10 lb cans, 10 in case	6 c	6½c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co ..... dis 45@50
H. H. Barton ..... dis 50 35 &5

Emery Wheels.

Detroit ..... dis 55@60
Norton's ..... dis 55@60
Grant ..... dis 55@60
Sterling ..... dis 60
Celluloid ..... dis 10&33⅓
Northampton ..... dis 55
Crystal ..... dis 65@70
Vitrified ..... dis 60
Vulcanite ..... dis 10&10

Files.

Nicholson ..... dis 60&10@60&10&10
" X. F ..... dis 25
Kearney & Foot ..... dis 60&10@60&10&10
Black Diamond ..... dis 60&10@60&10&10
Arcade ..... dis 60&10@60&10&10
Disston's ..... dis 65@70
Western ..... dis 70
Stub's ..... dis 25
Grobet's ..... dis 30
Reynolds Bros.' Hand Cut ..... dis 50
Industry File Works, hand cut ..... dis 50

Hammers.

P. S. W ..... dis 40
Atha new list, Jan. 15, 1887 ..... dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list ..... dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¾	4	3¾	3¼
Hexagon	15⅓	11⅓	8⅓	6	5¾	5¼	5
Washers	9	8	7	5	4¾	4½	4¼

In lots less than 100 lbs, ₩ lb add ½c., lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887 ..... dis 70 &10
Standard Penny Nails, ₩ keg card rate
{ Car lots $2.30
{ Less than car lots $2.40

Oilers.

Zinc and Tin ..... dis 60
Brass and Copper ..... dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz ..... dis 10@10&10

Packing, Steam.

Boston Belting Co. ..... dis 60
American Packing Hemp ..... ₩ lb 10@11
Russia Packing " ..... ₩ lb 14
Italian Packing " ..... ₩ lb 13@14
Plumbago Piston ..... ₩ lb 40
Morrison's " ..... ₩ lb 50
Square Flax " ..... ₩ lb 50
Sheet Rubber ..... ₩ lb 12@25
Excelsior Rubber ..... ₩ lb 50@

Picks.

Railroads, 5 to 6 lbs ..... $12 dis 60
" 6 to 7 lbs ..... $13 dis 60

Pulleys.

Iron Pulleys, Walker List ..... dis 45
Medart Pulleys ..... dis 55
Split Wood Pulleys ..... dis 50@55

Rivets.

Iron, Thousand, list November 17, ... dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17 ..... dis 50
Copper ..... dis 50@50&10

Rope.

Manilla, ½ inch and over ..... ₩ lb 15½
Sisal, ½ inch and over ..... ₩ lb 13½

Sand Paper.

B. A. & Co ..... dis 45@50
H. H. Barton's ..... dis 40@45
New England Flint ..... dis 40@50
Barton's Garnet ..... dis 20

Saws.

Disston's Circular ..... dis 45
" Band ..... dis 20
" Scroll ..... Net
Hack Saw Stubs ..... dis 20
" " Eureka ..... dis 20
" " Star ..... dis 20
Saw Swages Disston's ..... dis 20
Atkins' Circular Saws ..... dis 50
" Mill, Mulay and Drag Saws .dis 40&10
" Wood Saws ..... dis 40&10
" Silver Steel Diamond Cross-cut Saws ..... dis 70c per ft
" Dexter Cross-cuts ..... dis 50c "
" Diamond " ..... dis 30c "
" Tuttle Tooth Cross-cuts .dis 25c "
" One-man Cross-cuts ..... dis 32c "
No. 1 Handles ..... dis 23c per pair
No. 6 " ..... dis 16c "
Excelsior Saw Tools ..... $6 per doz
Perfection " ..... $15 "
Detroit Saw Works, Circular ..... dis 50
" " " Band ..... dis 25
" " " Mulay ..... dis 45

Screws.

Wood Screws—List Jan 27, 1889.

Flat head iron ..... dis 50
Round head iron ..... dis 40
Flat head brass ..... dis 45
Round head brass ..... dis 35
Square Cap ..... dis 65
Hexagon Cap ..... dis 60
Set C. H. C. P ..... dis 70
Machine, flat head, iron ..... dis 60
Machine, round head, iron ..... dis 60
Bench and hand—
Lag or coach ..... dis 75@75&10
Coach, patent gimlet point ..... dis 75

Shovels and Spades.

Ames' list November 1, 1885 ..... dis 20
Dennis ..... dis 5.25
Hussey & Binns, railroad ..... dis 8.00

Taps.

Cards, Hand and Nut to 2 in ..... dis 50
Carpenters' " " " ..... dis 50
Morse " " " ..... dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps ..... dis 55
Pipe Taps to 2¼ in ..... dis 70
Stay Bolt Taps ..... dis 25
Stove Bolt Taps ..... dis 50
Pulley Taps ..... dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ½lb Balls		21c@29c
No. 18 " " ¼ and ½ "		18c@28c
No. 36 " " ¼ and ½ "		16c@27c
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine)		11½c
3-Ply " 1lb Balls		12@12½c
3-Ply " 1¼ lb Balls		11@11½c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box ..... dis 60
Parker's ..... dis 20@25
Prentiss ..... dis 20
Stephen's ..... dis 25@30
Barrett's ..... dis 30
Miller's Falls ..... dis 40
Merrill's ..... dis 10@15
Howard ..... dis 30

Wire.

New List, Jan. 18, 1884

Brass and copper ..... dis 20@25
Bright and annealed, Nos. 0@18 .. dis 70&10@75
" " Nos. 19@26 .. dis 75@75& 5
" " Nos. 27@36 .. dis 75&10& 5
Coppered Nos. 0 to 18, market list .. dis 70@70& 5
Galvanized Nos. 0 to 18 " " ..... dis 65&5
Tinned market Nos. 0 to 18 ..... dis 67½
Cast steel ..... dis 50
Tinned Broom Wire ..... dis 70&5@70&10
Annealed Fence, Nos. 8 and 9 ..... dis 75
Annealed Grape, Nos. 10 to 14 ..... dis 75
Stub's Steel Wire regular ..... $6.00@lb dis 3

Wrenches.

Coe's genuine, ... dis 50
Girard Standard ..... dis 70&10
Agricultural ..... dis 75&10
Mechanics' ..... dis 55&10,& 3
Bemis & Call's Combination ..... dis 35
Donohue's Engineers ..... dis 20&10
Lamson & Sessions Engineers ..... dis 60
Billings & Spencer's Drop Forged ..... dis 10
William's " " ..... dis 10
Alligator " " ..... dis 40

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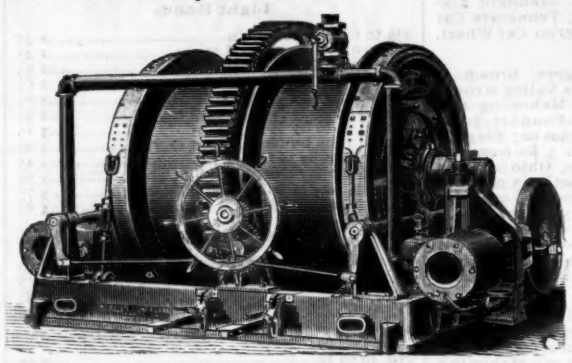

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Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 70&10&7½
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&5
Loose joint, jap.....dis 70&5
Loose joint, jap. with acorns.....dis 7c&5
Loose pin, acorns.....dis 70&5
Loose pin, japanned acorns.....dis 7c&5
Loose pin, acorns, jap. plated tips.....dis 70&5
Wrought steel—
Wrought, fast joint, narrow.....dis 70&5
Wrought, fast joint, broad.....dis 7c&5
Wrought, loose joint, broad.....dis 7c&5
Table Butts, back flaps, etc.....dis 70&5
Regular inside blind.....dis 7c&5
Light inside blind.....dis 7c&5
Loose pin.....dis 70&5
Light loose pin.....dis 7c&5

Carbonized Felt and Building Papers.

(POWERVILLE BRAND.)

	Per roll of 500 sq. feet.
Eberts Bros., Detroit.	
No. 1—Slaters'.....	$1.25
"A," Stringed Roofing, Light.....	1.50
"B," Stringed Roofing, Medium.....	1.75
"C," Stringed Roofing, Heavy.....	2 00
Stringed, Rosin-Sized.....	1.00

MILCELLANEOUS.

Asphaltum, Trinidad Refined, ₩ ton.....$30 00
Asphaltum, Fine Grade, ₩ lb.....08
Coal Tar Felt, 1 Ply, ₩ lb.....02
Coal Tar Felt, 2 Ply, ₩ roll 108 sq ft.....1 42½
Coal Tar Felt, 3 Ply, ₩ roll 108 sq ft.....1.85
Roofing Pitch, ₩ gal.....09

Chains.

Revised List.

Trace, 6½-10-2.....₩ pair 1.03
Trace, 6½-10-3.....₩ pair .92 .....50&10
Trace, 7-10-2.....₩ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....₩ lb 5½@6
Jack Chain, Iron.....dis 75@75&5
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt	$4 00	$4 50	$.....
Dairy, 14 qt	4 50	5 00	.....
Fire 12 qt	5 00	.....	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber } Slop } Commode } 5 and 5X 14 qt.	6 50	7 50	8 50
Jars, slop, 5 and 5X 14 qt	8 00	9 00	10 00
Basins, wash—			
10½ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13¼ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in.	.....	2 25	.....
Baskets, waste paper, 13 in	.....	6 00	.....
Spittons, "Daisy," pressed			
8 inch	4 00	4 50	5 00
10 and 11¾ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....₩ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 50&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 40
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 50&10
Richard's.....dis 30@30&10

Horse Nails.

No.	10	9	8	7	6	
Ausable, ₩ lb.	23	24	25	26	28	dis 25&10
Putnam, ₩ lb.	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....₩ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....₩ keg $4 00
Mule Shoes, at factory.....₩ keg $5 00

Knobs.

Carriage, japanned.....₩ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10&50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$3 00@3 25

Locks, Bolts, Etc.

P. & F. Corbear, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60
Escutcheons and keys.....dis 60
Padlocks and padlock keys.....dis 66⅔
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 60
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....₩ gross $4.80

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....₩ doz $6 00
Bishop's O K.....₩ doz $5 25
Bishop's Pioneer.....₩ doz $3 75
Bishop's American.....₩ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@$6...dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....₩ gross $15 00

Scales.

Hatch, Counter, No. 171.....₩ doz $21 00
Hatch, Tea, No. 161.....₩ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....₩ doz $18 dis 25

Squares.

Steel and iron } Nickel plated.....dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds dis 70&10&10
American carpet tacks all kinds.....dis 70&10&10
Swedes iron carpet tacks, all kinds dis 70&10&10
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Tinned Swedes iron Upholsterers' tacks.....dis 70&10&10
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Finishing nails.....dis 65
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" " " tinned.....dis 66&10
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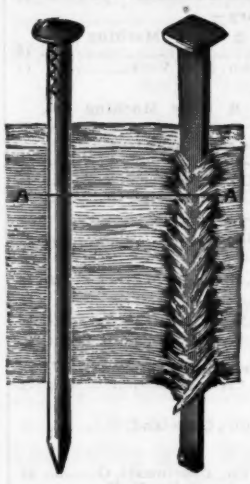
Chair nails.....dis 66&10&10
Common and patent brads.....dis 66&10&10



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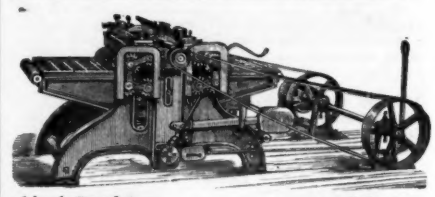

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Planer Planes 24x9,	120 00
Planer Planes 18x5½,	85 00
12 inch Buzz Planer,	85 00
Jig Saw, 6 saws,	65 00
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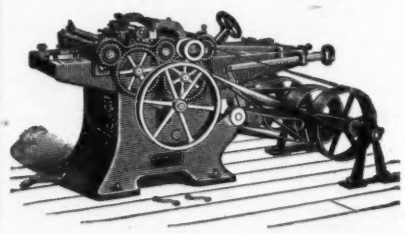

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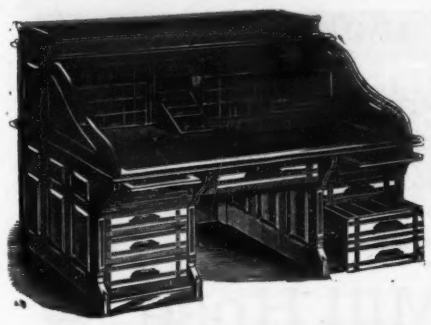

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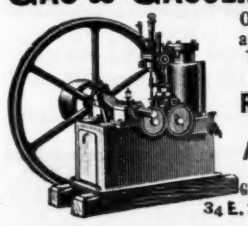

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Through Sleepers Between
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AND DAY COACHES BETWEEN
Toledo and Pittsburgh, Via Akron, Cuyahoga Falls, Kent, Ravenna, Leavittsburg, Warren, Niles, Girard, Youngstown, New Castle and Allegheny.
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	Arrive.	Depart.
N. Y. & Pitts. Express.....	‡5 38 a m	*8 25 a m
Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommo.....		†6 40 a m
Pittsburgh Express.....	†6 25 p m	
Youngstown Local.....	†8 05 a m	
Mahon'g div. & Pitts Local		*11 40 a m
Mahoning Val. Accom.....		†4 30 p m
Pittsburgh Express.....	†1 20 p m	11 10 p m
New York Express.....	*8 00 p m	.....

*Daily. †Daily, except Sunday. ‡Daily except Monday.

Cleveland & Canton Railroad.

(Standard Gauge.)

Depart for—

Zanesville and Coshocton—6:50 a. m., 3:00 p. m.
Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—

Zanesville and Coshocton—10:30 a. m.,6:30 p. m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.
Trains marked * run daily.

Valley Railway.

FOR AKRON, CANTON AND MARIETTA.

Depot foot South Water Street.

	Depart.	Arrive.
Valley Junction Mail.....	*7 45 a m	*6 25 p m
Marietta Express.....	†11 15 a m	†2 25 p m
Valley Junction Express...	*4 15 p m	*10 25 a m
Cleve. and Canton Express	*7 05 p m	†8 20 a m

*Daily. †Daily, except Sunday.

J. T. JOHNSON, Gen. Supt. J. B. CAVEN, Gen. Pass. Agt.

From Cleveland Union Station.

PENNSYLVANIA LINES.

Cleveland & Pittsburgh R. R.

	Depart.	Arrive.
For Pittsburgh, Baltimore, Washington, Philadelphia and New York.	7 45 a m	d5 25 a m
	1 15 p m	12 50 p m
	d11 10 p m	6 35 p m
Wheeling and Bellaire.	7 45 a m	12 50 p m
	1 15 p m	6 35 p m
	*11 10 p m	.....
Alliance Accom.....	3 25 p m	10 10 a m
Ravenna Accom.....	5 00 p m	8 25 a m

d Daily. * Except Saturday. Other trains except Sunday.

From Cleveland Union Station.

Mt Vernon and Pan Handle Route

Cleveland & Pittsburgh R. R.

	Depart.	Arrive.
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon, Columbus, Xenia, Dayton, Cincinnati, Louisville, Indianapolis, St. Louis, and all points in the South and Southwest.	8 00 a m	d 7 00 am
	d 8 00 p m	5 40 p m
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon and Columbus.	1 15 p m	12 50 p m
For Cuyahoga Falls, Akron, Orrville, Chicago, and all points in the West and Northwest.	8 00 a m	5 40 p m
	3 25 p m	10 10 a m

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No. 72, New York & Pitts. Express....	* 8 10 a m
No. 70, Pittsburgh Accom.....	*11 25 a m
No. 64, New York & Pitts. Limited...	* 2 50 p m
No. 66, Mantua Accommo.....	* 4 20 p m
No. 74, Youngst'n Ex.....	† 6 00 p m
No. 68, New York & Pitts. Ex.....	*11 00 p m
	Arrive.
No. 61, N. Y. & Pittsburgh Express...	† 5 15 a m
No. 71, Youngstown Accom.....	* 7 15 a m
No. 65, New York & Pitts. Lim.....	* 9 55 a m
No. 67, Pittsburgh Accom.....	*12 45 p m
No. 73, Leavitsburgh Local.....	* 2 10 p m
No. 63, New York & Pitts. Ex.....	* 6 50 p m
No. 75, Mantua Accom.....	* 7 20 p m
No. 69, Youngstown Express.....	† 9 10 p m

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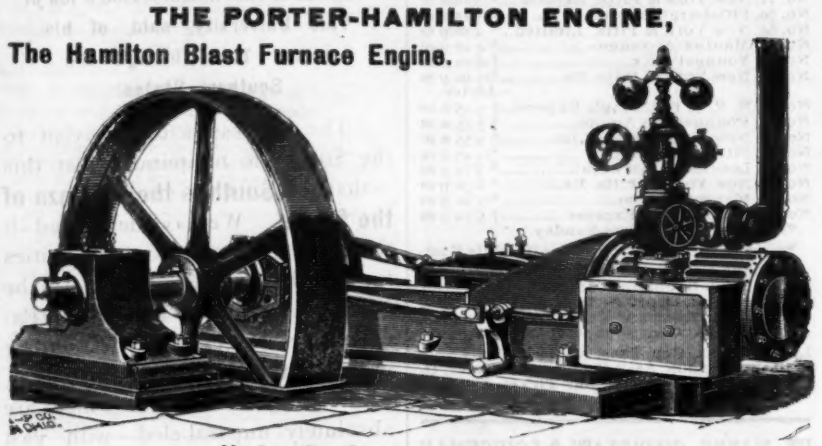

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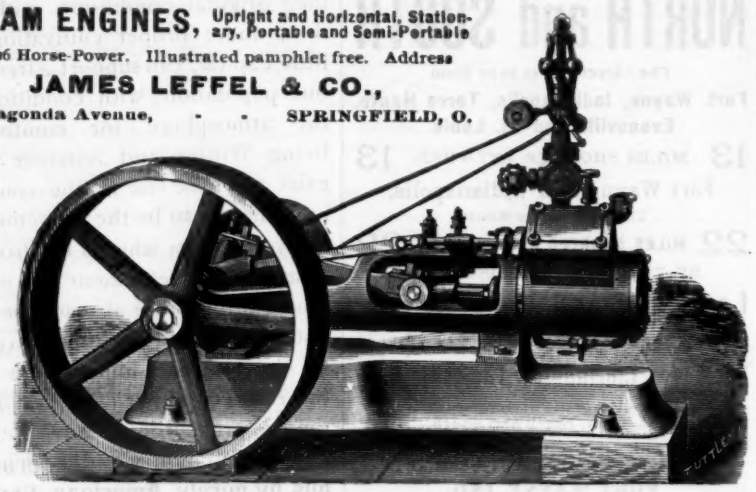

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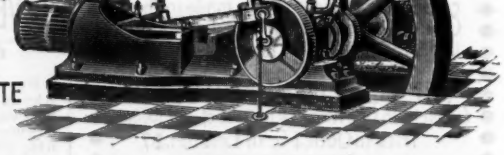

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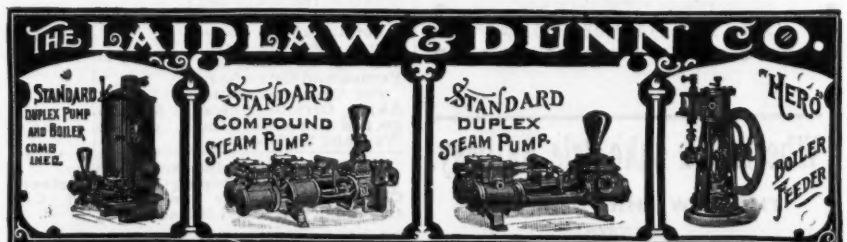

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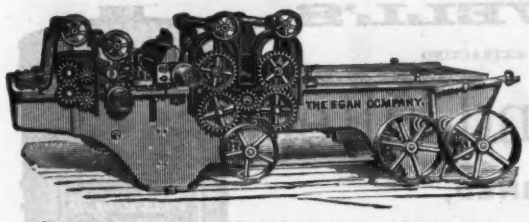

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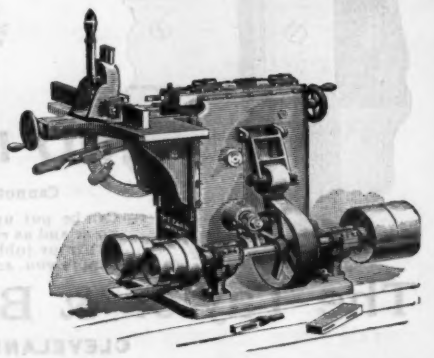

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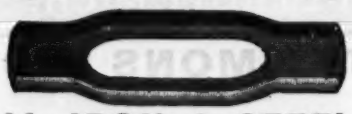

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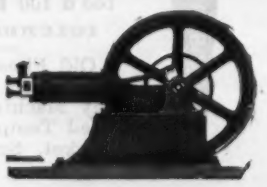

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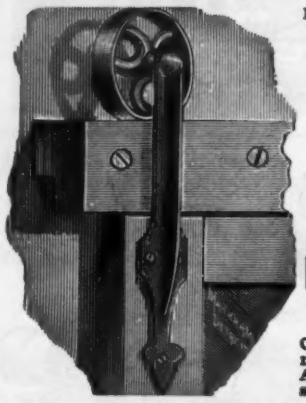

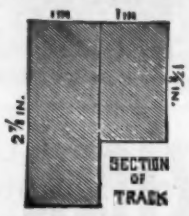

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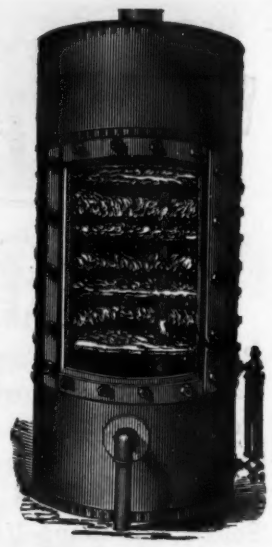

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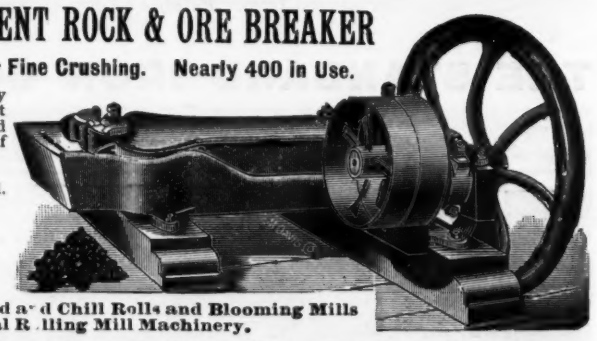

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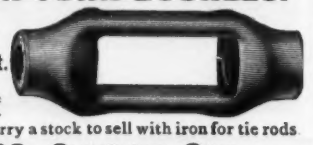

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